THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

VOL. V.—No. 95. NEW YORK, TUESDAY, DECEMBER 1, 1863. $3 PER ANNUM.

MANUFACTURE OF ALCOHOL BY MEANS OF ILLUMINATING GAS.

The industrial world has been, for some time, much interested in a process for the production of alcohol by means of illuminating gas, at a very low cost (25 francs per hectolitre), and one litre of alcohol so prepared is mentioned among the principal curiosities at the London Exhibition. Moreover, it has been said by some journals, both in France and elsewhere, that the manufacture is going on at St. Quentin, and that the apparatus which receives coal upon one side pours out alcohol on the other.

These are exaggerations of certain results obtained by a company which has been organized at St. Quentin for undertaking the application of a patent obtained by Mr. Cotelle, a manufacturing chemist. The patent is founded upon the experiment by means of which Berthelot, in 1855, accomplished the synthesis of alcohol, by causing the absorption of olefiant gas, C^4H^4, by sulphuric acid, thus converting it into sulpho-vinic acid, a compound readily turned into alcohol by processes long since known.

This experiment made known by Hennell, thirty years ago, has now been repeated with C^4H^4 prepared from alcohol. Mr. Cotelle employs mostly illuminating gas, which, as we know, contains from 4 to 12 per cent. of C^4H^4. Separating this by means of sulphuric acid, there remains a gaseous mixture, composed of C^2H^4, CO. H, &c., very suitable for burning, so that this first material ought to cost very little, especially if the manufacture be undertaken at the mines, so as to take advantage of the gas which issues from the coke furnaces.

To produce one hectolitre of alcohol of 90 per cent., Mr. Cotelle uses not more than 40 cubic metres of C^4H^4, which corresponds to about two tons of the northern coal used at St. Quentin.

But the difficulty is not solely in the production of C^4H^4; there is also needed a large amount of concentrated sulphuric acid, (10 parts of HO SO^3 to 1 of alcohol). This, used at 66° of Baumé's areometer, remains, after the completion of the work, at from 20° to 25°. It is necessary, then, either to concentrate it again for a new process, or to utilize it in its diluted state; from this we see the necessity for either concentrating apparatus or leaden chambers; for a hectolitre of alcohol requires for its production 1,500 kilometres of sulphuric acid at 66°.

Thus we perceive a series of difficulties which are not yet overcome, but which are vanishing day by day. Still, Cotelle's process is interesting and we will give it in a few words. Starting with the purification of gas, we free it from sulphydric acid and ammonia, then desiccate it by passing it over HO SO^3. Drawn along by suction like that of a pump, the dry gas is directed to a column of glass or sandstone furnished with trays or diaphragms pierced with small holes, from which descends HO SO^3 in a finely divided state to meet and dissolve the C^4H^4.

This solution takes place slowly, so that the apparatus needs as many as forty trays to distribute enough sulphuric acid to absorb the gas and be saturated with it.

The sulpho-vinic acid thus obtained is next treated with five times its volume of water, and the mixture submitted to the action of a stream of vapor which carries over the alcoholic product. The vapors are condensed; the alcoholic liquid thus obtained is redistilled over a little lime, to separate any sulphuric acid which may have distilled over, and the liquid condensed from this distillation is rectified to produce alcohol at 90°.

The residue of this operation is, as we have seen, sulphuric acid of 20° to 25°, and a gaseous mixture representing the gas from ordinary coal less HS, NH^3, and C^4H^4: this latter can be advantageously used for fuel.—*Silliman's Journal.*

NEW PROCESS FOR MAKING GAS.

Mr. J. C. Jeffcott, of Cork, Ireland, has patented some improvements in the production and generation of gases, and also in apparatus connected therewith. The object sought to be obtained in the production and generation of gases by the invention consists chiefly in utilizing the heat not used, or which escapes without being used, in steam or other furnaces and fire-places of every description. The means to do this consists of introducing into or placing within the furnaces or fire-places vessels of various forms, according to the construction of said furnaces or fire-places, so as that the said heat may be used; these vessels, retorts, or chambers must be formed and placed and correspond with the form of the furnaces or fire-places now in use, or to be used for this or other purposes. The form to be generally used will consist of a retort or retorts to be placed lengthways or at the sides, or as may best suit the fire-bars of the different fire-places; these retorts or other vessels will have mouth-pieces or other close covers, so as to be air-tight, and through these mouths-pieces or covers are to be introduced the animal, vegetable, or mineral substances from which the different gases are to be obtained, by their cohesiveness being destroyed by the heat before referred to, and not hitherto used for that purpose. The gases, after being set free in the retorts, chambers or other such vessels, are then conducted by pipes in the way usually done, and applied to and for the different purposes for which they are now used. He likewise claims to be the inventor of a new description of furnace for these purposes, to be entirely composed of wrought or cast metal, and this consists of—first, a fire-place, with fire-bars on which the combustibles or heating substances are to be placed, the chamber, retorts, or vessels for holding the different materials rich in the different gases; these chambers, retorts, or other vessels to have the mouth-pieces for introducing the substances to be used, and then another casing to be placed over the entire, so that the heat may be prevented from escaping when the gases are disengaged, to be conducted by pipes in the usual manner. Lastly, Mr. Jeffcott purposes a new system of lighting and heating railway carriages, and the different railway stations along the different lines; he effects this by an apparatus first composed of a cast-iron or clay retort placed in the furnaces of the locomotive, and the gas obtained from coals and distilled in the retort by the heat of the fire then being used for generating steam is conveyed by pipes or tubes composed of metallic substances, or of India rubber, gutta percha, or other flexible materials, to the tank and gasholder containing the purifying water, as aforesaid, attached, annexed, or placed near the engine; it is then conveyed by tubes or piping to the carriages, and by the action of the gas when ignited on metallic plates, or the agency of a gas stove, the compartments of the carriages are heated and lighted. On the arrival of the engines at the stations along the line the gas already distilled and placed in the gasholder attached to the engine, as aforesaid, is conveyed by pipes to a gasholder erected at the station, when it is ready for use.

NOVEL APPLICATION OF WATER-POWER.

Just forty years since, M. Fourneyron commenced a series of experiments in water-power which resulted in his invention of the turbine or horizontal water-wheel. Since that period considerable improvements have been made in the turbine by different persons, the chief and most useful having been effected by Mr. Schiele, of this city, whose ingenious applications of mechanical curves seem to have been fully adapted by him for the production of this form of motive power. One form of his arrangement for supplying power we have recently seen (working the bellows of a powerful organ) at the residence of a citizen of Manchester, where the impression was given that if all the results achieved by Mr. Schiele be equally successful, a new feature will be rapidly developed in applying water-power, especially in cases where a small amount of power may be required at irregular periods; as in the case of working the bellows of organs, driving small lathes, fans for ventilation, printing and other presses, sewing-machines, washing-machines, &c. In the house referred to, a water-wheel four feet in diameter, consuming fifteen gallons of high pressure water per minute, formerly employed to work the bellows of an organ in the drawing-room over the cellar wherein the water-power was produced, has been replaced by a turbine only one and a quarter inch in diameter, with a three-inch case one and a quarter-inch wide, supplied by a ⅝-inch pipe, and consuming less than a gallon of water per minute. An ingenious and yet very simple economical regulator, invented by Mr. Eccleston, organ builder, of this city, works in connection with the apparatus just mentioned by means of which the organist may easily supply his instrument with the required wind by simply turning a handle near the organ. By availing themselves of the ample supply of high-pressure water secured to the city by our corporation, all persons using machines requiring a small amount of power appear now to have supplied to them by this invention the means of working their machines with no trouble and at a trifling cost; while at the same time this kind of turbine appears to be equally well adapted for turning large mills and works, even when they require several hundreds of horses' power. Orders are now being executed by Messrs. Schiele & Co., for the construction of fifty small turbines, to be used as direct action fans (the turbine and fan being on one spindle) for the production of the new gas obtained from petroleum. Several powerful turbines will shortly be at work in this locality, when our readers will be able to see and judge for themselves of the extraordinary yet simple effect of this new water engine, which seems to be equally suited for the requirements of the sewing-machine in a lady's boudoir, the washing machine and mangle in the laundry, or the hydraulic press and hoist in our huge warehouses. In fact, wherever our Corporation waterworks will enable persons to turn a water-tap, and thus to supply at a moment's notice the power required, these machines will be available; while all the risk from fire and the cost and trouble of steam boilers and engines will be avoided.—*Manchester, England, Guardian.*

LEAKAGE OF GAS MAINS.—It is estimated that in the city of London one-sixth of the gas made escapes from the mains, and is consequently a dead loss to the gas companies. This clearly shows the defects of the old system of joining mains, for it is almost wholly at the joints that the leakage occurs.

GAS-LIGHT COMPANIES IN THE UNITED STATES.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS
1857	ADRIAN	Mich.	50,000	50	—	May & November.	4,000	3 50	....	....	
1856	AKRON	O.	20,000	33⅓	—	Do.	3,500	3 00	....	..	
1845	ALBANY	N. Y.	25 ,000	20	4	January & July.	65,000	3 00	120	....	None in market.
1858	ALBION	N. Y.	30,000	100	—	Do.	3,000	3 80	....	....	
1851	ALEXANDRIA	Va.	106,520	—	—	City Works.	9,000	3 50	....	....	
1852	ALLEGHANY	Pa.	200,000	25	4	May & November.	25,000	3 00	....	....	
1853	ALLENTOWN	Pa.	60,000	100	3½	Do.	5,000	3 50	....	....	
1857	ALTON	Ill.	75,000	—	—	Private Works.	4,000	3 50	....	....	
1859	ALTOONA	Pa.	40,000	20	4	January & July.	5,000	3 00	....	....	
1859	AMESBURY AND SALISBURY	Mass.	30,000	25	—	Do.	7,000	4 00	....	....	
1858	ANNAPOLIS	Md.	100,000	25	—	Do.	4,000	4 00	....	....	
1858	ANN ARBOR	Mich.	23,000	50	5	March & September.	5,500	4 00	....	....	
1858	ASTORIA	N. Y.	20,000	50	—	Do.	6,000	4 00	....	....	
1855	ATLANTA	Ga.	50,000	25	5	January & July.	12,000	5 00	....	....	
1857	ATTLEBORO'	Mass.	6,000	50	3	Do.	2,000	6 00	....	....	
1850	AUBURN	N. Y.	80,000	50	5	Do.	10,000	7 00	....	....	
1851	AUGUSTA	Ga.	80,000	25	8	Do.	9,000	6 00	....	....	
1853	AUGUSTA AND HALLOWELL	Me.	84,700	50	5	Do.	10,000	4 00	....	....	
1860	AURORA	Ind.	10,000	—	—	Private Works.	3 500	3 50	....	....	Formerly used Sanders' Water-Gas. Recently altered to Coal Gas-Works. None for sale.
1817	BALTIMORE	Md.	550,000	100	5	June & December.	150,000	2 50	150	....	
1852	BANGOR	Me.	120,000	100	2½	January & July.	12,000	3 00	100	....	
1855	BATAVIA	N. Y.	32,000	20	4	Do.	2,500	4 00	100	100	Stock firm. Good works and well managed.
1853	BATH	Me.	65 000	100	3	April & October.	10,000	3 75	...	...	
1859	BATH	N. Y.	15,000	50	—	May & November.	3,000	7 00	....	....	
1861	BATTLE CREEK	Mich.	15,000	—	—	January & July.			....	....	
1858	BELFAST	Me.	14,000	100	—	Do.	7,000	7 00	....	....	
1856	BELLEFONT	Pa.	20,000	25	2	Do.	3,500	4 00	....	....	
	BELOIT	Wis.	30,000	—	—	Do.	4,000	4 00	....	....	
1854	BETHLEHEM	Pa.	50,000	50	4	June & December.	2,000	3 20	...	....	
1859	BEVERLY	Mass.	40,000	100	—	January & July.	4,000	4 00	....	....	
1853	BINGHAMPTON	N. Y.	50,000	50	3½	Do.	10 000	4 00	....	....	
1859	BIRMINGHAM	Pa.	40,000	50	—	Do.	4,000	4 00	....	....	
1855	BLOOMINGTON	Ill.	40,000	50	—	Do.	6,000	4 00	....	....	
1853	BORDENTOWN	N. J.	50.000	25	3	June & December.	4,000	3 80	....	....	
1822	BOSTON	Mass.	1,000,000	500	5	Do.	130,000	2 25	....	....	
1859	BRATTLEBORO'	Vt.	21 000	—	—	Do.	3,000	4 00	....	....	
1851	BRIDGEPORT	Ct.	90,000	25	4	January & July.	10,000	4 00	90	....	Passed last dividend.
1857	BRIDGETON	N. J.	50,000	20	—	Do.	5,000	4 00	....	...	
1856	BRISTOL	Pa.	30,000	25	3	February & August.	3,000	4 00	....	....	
1855	BRISTOL	R. I.	35 000	50	2	January & July.	6.000	4 00	....	....	
1859	BROCKPORT	N. Y.	25,000	100	3	Do.	1,500	4 00	....	....	
1853	BROOKLINE	Mass.	66,000	100	3½	February & August.	3,500	3 50	....	....	
1825	BROOKLYN	N. Y.	2,000,000	25	5	January & July.	75,000	2 50	170	160	
	BROWNSVILLE	Pa.				Do.			....	....	
1848	BUFFALO	N. Y.	600,000	50	5	Do.	70,000	2 90	140	125	
1852	BURLINGTON	N. J.	100,000	25	3½	Do.	5.000	4 00	105	....	
1853	BURLINGTON	Vt.	75,000	25	2½	Do.	10,000	4 50	....	....	
1859	BURLINGTON	Iowa.	65,000	50	—	Do.	8,000	4 00	....	....	
1861	CALAIS	Me.	90,000	100	—	Do.	10,000	3 50	....	...	
1852	CAMBRIDGE	Mass.	300,000	100	5	February & August.	20,000	3 50	100	97½	
1852	CAMDEN	N. J.	300,000	100	3	April & October.	15,000	3 50	105	100	
1858	CANANDAIGUA	N. Y.	50,000	50	—	January & July.	3,000	4 00	90	80	
1856	CANTON	O.	19,000	50	6	March & September.	6,000	3 00	....	....	
1853	CAPE ISLAND	N. J.	80,000	100	—	October.	10,000	6 00	....	...	Watering place.—These Works only run in summer.
1860	CARBONDALE	Pa.	16,000	25	—	March & September.	5,000	4 00	....	....	
1855	CARLISLE	Pa.	30,000	25	—	January & July.	4,000	4 00	.. .	...	
1856	CATASAUQUA	Pa.	15,000	25	5	May & November.	2,000	4 00	....	....	
1858	CATSKILL	N. Y.		—	—	Private Works.	3,000	3 00	....	....	Owned by G. T. Sutton.
1857	CHAMBERSBURG	Pa.	30,000	25	—	January & July.	3,000	4 00	....	....	
1846	CHARLESTON	S. C.	723,800	25	4	Do.	50,000	4 00	....	....	
1851	CHARLESTOWN	Mass.	200,000	50	4	Do.	30,000	3 00	105	. ..	
1858	CHARLOTTE	N. C.	14,000	50	10	March & September.	3,500	6 00	....	....	
1859	CHARLOTTEVILLE	Vt.	15,000	25	—	Do.	4,000	4 50	....	...	
1851	CHELSEA	Mass.	100,000	100	3½	January & July.	8,000	3 50	....	....	
1856	CHESTER	Pa.	35,000	25	3	April & October.	4,000	4 00	....	....	
1849	CHICAGO	Ill.	1,200,000	25	5	January & July.	100,000	2 50	150	140	Very scarce. Stock wanted.
1857	CHICOPEE	Mass.	50,000	20	—	Do.		4 00	....	....	
1851	CHILLICOTHE	O.	40,000	25	4	Do.	12,000	3 50	....	....	
1841	CINCINNATI	O.	1,600,000	100	5	Do.	225,000	2 50	....	....	
1859	CITIZENS', BROOKLYN	N. Y.	1,000,000	20	—	Do.	135,000	3 00	128	125	
1860	CITIZENS', READING	Mass.	90,000	100	—				....	....	
	CLARKESVILLE	Tenn.	100,000	50	—	Do.	5,000	4 00	....	....	
1860	CLAREMONT	N. H.	20 000	100	—	March & September.	3,000	4 00	....	....	
1846	CLEVELAND	O.	200,000	10	5	January & July.	20,000	3 00	....	....	
1858	CLINTON	Mass.	30,000	500	5	Do.	3,000	4 00	....	...	
1859	CLYDE	N. Y.	10,000	50	4	Do.	2,500	4 00	...	....	
1854	COHOES	N. Y.	50,000	20	3½	April & October.	5,000	3 60	....	....	Formerly Rosin-Gas, but now Coal. A well managed company. Stock firmly held.
1860	COLD SPRING	N. Y.	30,000	50	—	Do.	3,500	4 00	95	....	
1860	COLD WATER	Mich.	25,000	50	5	January & July.	4,000	4 00	....	....	
1852	COLUMBIA	Pa.	37,500	25	—	Do.	4,000	3 50	....	....	
1852	COLUMBIA	S. C.	44,000	25	4	Do.	6,000	6 00	....	....	
1857	COLUMBIA	Cal.	50,000	25	—	Do.	4,500	10 00	....	....	
1853	COLUMBUS	Ga.	54,000	25	5	Do.	5,000	7 00	....	....	
1850	COLUMBUS	O.	100,000	10	6	Do.	30,000	3 00	....	....	
1853	CONCORD	N. H.	50 000	50	5	Do.	8,000	3 50	....	....	
1853	COVINGTON AND NEWPORT	Ky.	100,000	50	3½	Do.	28,000	4 00	...	....	
1854	CUMBERLAND	Md.	60,000	50	3	Do.	6,000	4 00	....	....	
1857	DANBURY	Ct.	50,000	25	4	Do.	2,000	3 75	....	...	
1856	DANVILLE	Pa.	30,000	25	—	June & December.	3,000	4 00	....	....	
1855	DAVENPORT	Iowa.	56,000	100	—	Do.	6,000	5 00	....	....	
1848	DAYTON	O.	50,000	25	5	February & August.	8,000	3 50	....	.. .	
1853	DEDHAM	Mass.	40,000	50	—	January & July.	3,000	4 00	....	....	
1860	DELAWARE	O.	30,000	25	—	Do.	2,500	3 00	....	....	
1849	DETROIT	Mich.	500,000	50	5	Do.	30,000	3 50	160	150	Excellent Stock. No sales.
1860	DOBBS' FERRY	N. Y.	25,000	—	—	Do.	3,000	4 00	....	....	
1854	DORCHESTER	Mass.	150,000	100	—	Do.	14,000	4 00	....	....	
1859	DOVER	Del.	12,000	—	—	Private Works.	2,000	4 00	....	....	
	DOVER	N. H.				January & July.			....	....	
1857	DOYLESTOWN	Pa.	50,000	—	—	Do.	3.000	4 00	....	....	
1854	DUBUQUE	Iowa.	50,000	115	3½	Do.	17,000	4 50	....	115	This stock is wanted at par.
1853	EAST BOSTON	Mass.	133,000	25	4	Do.	20,000	3 50	....	145	
1858	EAST GREENWICH	R. I.	11,200	100	15	Do.	3,000	7 00	....	...	No transactions.
1861	EAST HAMPTON	Mass.	10,000	25	—	Do.	5,000	9 00	....	....	
1861	EAST NEW YORK	N. Y.	50,000	50	—	Do.	12,000	3 50	....	....	
1857	EASTON	Md.	9,000	10	—	Do.	1,500	7 00	....	....	
1850	EASTON	Pa.	125,000	50	4	June & December.	6,000	3 60	....	....	
1856	EASTPORT	Me.	50,000	55	—	Do.	3,000	4 00	....	....	
1855	ELIZABETH	N. J.	100,000	20	4	January & July.	14,000	3 50	....	....	
	ELLICOTT'S MILLS	Md.	10,000	—	—	Do.	4,000	4 00	....	....	
1852	ELMIRA	N. Y.	50,000	25	3½	Do.	5,000	4 00	....	...	
1852	ERIE	Pa.	68,000	50	3½	June & December.	10,000	3 00	....	....	
1838	EVANSVILLE	Ind.	60,000	50	4	January & July.	12,000	4 00	110	....	A very good Company.
	EXETER	N. H.	60,000	—	—	Do.	12,000	. ..	....	...	
	FAIR HAVEN	Ct.	20,000	25		Do.	8,000	4 00		....	
1847	FALL RIVER	Mass.	26,000	—	—	Private Works.	12,000	3 50	....	....	
1859	FAYETTEVILLE	N. C.	25,000	100	6	January & July.	7,000	6 00	....	....	
	FIFTH WARD (Milwaukee)	Wis.	50,000	25	—	Do.	10,000	4 00	....	....	
1857	FISHKILL	N. Y.	10,000	20	—	April & October.	1,500	9 00	....	....	Make Petroleum-Gas.
1853	FITCHBURG	Mass.	100,000	50	3	January & July.	5,000	4 00	....	....	
1859	FLEMINGTON	N. J.	20,000	—	—	Do.	3,000	4 00	....	....	
1855	FLUSHING	N. Y.	20,000	50	1½	March & September.	6,500	4 00	...	....	
1858	FOLSOM	Cal.								....	
	FORT WAYNE	Ind.	40,000	25	—	Do.	6,000	4 00	...	...	
1851	FRANKFORT	Ky.	50,000	—	—	City Works.	5,500	4 50	...	....	
1851	FREDERICK CITY	Md.	36,000	100	—	January & July.	5,000	6 70	....	....	
1854	FREDERICKSBURG	Va.	72,500	50	5	Do.	4,500	4 00	....	....	
1858	FREDONIA (Natural Gas)	N. Y.	10,000	100	—	Do.	2.000	4 00	....	....	Unlimited supply of Natural Gas.
1856	FREEPORT	Ill.	20,000	100	—	May & November.	10,000	4 00	....	....	

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When Chartered.	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1859	Fremont	O.	25,000	25	—	May & November.	2,000	4 50	....	....	
1858	Fulton	N. Y.	12,000	100	—	Do.	4,000	7 00	....	....	
1855	Galena	Ill.	70,000	100	—	Do.	8,000	4 00	....	....	
1859	Galion	O.	25,000	25	—	January & July.	1,800	3 00	....	....	
1858	Galveston	Texas.	150,000	50	—	May & November.	7,000	6 00	....	....	
1854	Gardiner	Me.	100,000	50	4	Do.	8,000	4 00	....	....	
1853	Geneva	N. Y.	75,000	25	2½	Do.	6,000	4 00	....	....	
1851	Germantown	Pa.	Merged	into	the	Philadelphia Works.	12 000	2 25	....	....	
1859	Gettysburg	Pa.	20,000	50	3	January & July.	2,500	4 00	....	....	
1854	Glenn's Falls	N. Y.	35,000	50	3	February & August.	4,000	4 00	....	....	
1854	Gloucester	Mass.	40,000	50	—	January & July.	5,000	3 50	....	....	
1857	Gloversville	N. Y.	15,000	25	—	Do.	3,000	3 50	....	....	
1858	Grand Rapids	Mich.	50,000	20	—	Do.	3,000	4 00	....	....	
1855	Great Barrington	Mass.	5,000	100	5	April & October.	2,000	7 00	....	....	
1849	Great Falls	N. H.	50,000	100	3	Do.	3,000	4 00	....	....	
1860	Greenfield	Mass.	20,000	50	2	January & July.	2,500	4 00	....	....	Close corporation.
1858	Greenpoint	N. Y.	100,000	50	5	Do.	20,000	3 00	....	....	
1859	Greensboro'	N. C.	12,000	50	—	April & October.	3,000	7 00	....	....	
1858	Greensburg	Pa.	30,000	25	3	May & November.	2,000	3 00	....	....	
1854	Hagerstown	Md.	15,000	20	—	January & July.	2,000	6 00	....	....	
	Hamilton	O.	15,000			Do.			....	....	
1859	Hannibal	Mo.	100,000	100	—	Do.	6,000	3 50	....	....	
1857	Harlem	N. Y.	350,000	50	3½	Do.	25,000	3 00	....	145	
1855	Harrisburg	Pa.	100,000	—	4	Do.	5,000	4 00	....	....	
1849	Hartford	Ct.	200,000	25	4	Do.	25,000	3 00	150	140	Stock in demand.
	Hastings	N. Y.				Do.	8,000	4 00	....	....	
1853	Haverhill	Mass.	50,000	50	—	Do.	5,000	4 00	....	....	
1859	Haverstraw	N. Y.	20,000	100	—	Do.	5,000	4 00	....	....	
1861	Hayesville	Mass.	15,000	25		Do.	4,000	4 00	....	....	
1859	Hempstead	N. Y.	16,000	25	—	Do.	1,000	4 00	....	....	
1862	Hoboken	N. J.	100,000	25	3	Do.	30,000	2 50	....	100	Works not yet built.
1856	Hollidaysburg	Pa.	30,000	25	2	Do.	4,000	3 50	....	....	
1861	Holyoke	Mass.	20,000	25	—	Do.	3,000	4 00	....	....	
1861	Homer & Cortlandt	N. Y.	40,000	100	—	Do.	6,000	4 00	....	....	
1854	Honesdale	Pa.	30,000	25	3	Do.	2,500	4 00	....	....	
1860	Hornellsville	N. Y.	12,000	50	—	Do.	2,000	4 00	....	....	
1853	Hudson	N. Y.	50,000	100	3½	February & August.	3,000	4 00	....	....	
	Hunter's Point	N. Y.									
1857	Huntington	Pa.	18,000	50	3	Do.	2,000	3 50	....	....	
1856	Huntsville	Ala.	7,325	25	—	June & December.	2,000	5 00	....	....	
	Indianapolis	Ind.	150,000	—	—	Do.	15,000	5 00	....	....	
1857	Iowa City	Iowa.	40,000	50	—	February & August.	4,000	4 50	....	....	
1852	Ithaca	N. Y.	75,000	25	3½	January & July.	6,000	4 00	....	....	
1857	Jackson	Mich.	25,000	50	5	Do.	6,000	3 50	....	....	
	Jackson	Miss.	80,000	50	—	Do.	4,000	4 50	....	....	
	Jackson	Cal.	50,000	30	—	Do.	4,000	10 00	....	....	
	Jacksonville	Flor.	30,000	20	—	Do.	2,000	7 00	....	....	
	Jacksonville	Ind.	50,000	50	—	Do.	4,000	5 00	....	....	
1858	Jacksonville	Mo.	25,000	25	—	Do.	7,000	6 00	....	....	
1856	Jamaica	N. Y.	20,000	—	4	Do.	6,000	4 00	....	....	
1858	Jamaica Plain	Mass.	75,000	100	3½	Do.	3,000	3 50	....	....	
	Jamestown	N. Y.	25,000	—	—	Do.	4,000	4 00	....	....	
1856	Janesville	Wis.	50,000	160	—	Do.	12,000	4 00	....	....	
	Jeffersonville	Md.	30,000	25		Do.	4,000	4 00	....	....	
1853	Jersey City	N. J.	300,000	—	5	Do.	80,000	3 00	150	....	No sales since formation of Hoboken Co.
1858	Jersey Shore	Pa.	15,000	25	—	Do.	2,000	3 70	....	....	
1856	Johnstown	Pa.	80,000	25	3	Do.	8,000	3 00	....	....	
1857	Joliet	Ill	300,000	100	—	June & December.	6,000	4 00	....	....	
1858	Kalamazoo	Mich.	30,000	50	5	Do.	10,000	4 00	....	....	
1860	Keene	N. H.	60,000	100	—	Do.	4,500	4 00	....	....	
1855	Keokuk	Iowa.	100,000	100	—	January & July.	10,000	4 50	....	....	
1855	Kingston	Pa.	50,000	50	—	Do.	3,000	4 00	....	....	
1859	Kittanning	Pa.	20,000	—	—	Doubtful.	5,000	4 00	....	....	Said to be a fraud.
1854	Knoxville	Tenn.	63,000	—	—	April & October.	4,000	5 00	....	....	
1860	Laconia	N. H.	20,000	100	—	Do.	4,000	6 00	....	....	
1859	La Crosse City	Wis.	100,000	50	—	June & December.	10,000	8 00	....	....	Petroleum and Wood Gas.
1854	Lafayette	Ind.	60,000	50	4	January & July.	10,000	3 25	....	....	
1856	Lambertville	N. J.	30,000	25	—	Do.	2,600	4 00	....	....	
1849	Lancaster	Pa.	100,000	50	4	Do.	10,000	3 00	....	....	
1856	Lancaster	O.	25,000	100	5	Do.	5,000	3 50	....	....	
1855	Lansinburg	N. Y.	25,000	100	—	Private Works.	7,000	4 00	....	....	
1849	Lawrence	Mass.	200,000	100	4	February & August.	15,000	3 50	....	....	
1859	Leavenworth	Kansas.	200,000	25	—	Private Works.	15,000	4 00	....	....	
1856	Lebanon	Pa.	26,000	50	—	February & August.	5,000	4 00	....	....	
1861	Le Roy	N. Y.	25,000	50	—	Do.	4,000	4 00	....	....	
1858	Lewisburg	Pa.	20,000	100	—	January & July.	4,000	4 00	....	....	
1852	Lewiston	Me.	100,000	100	3	Do.	10,000	3 20	....	....	
1856	Lewistown	Pa,	30,000	50	3	April & October.	3,000	3 10	....	....	
1853	Lexington	Ky.	100,000	25	4	January & July.	5,000	4 00	....	....	
1853	Little Falls	N. Y.	112,000	25	—	Do.	3,500	7 00	....	....	
1861	Little Rock	Ark.	20,000	—	—	Do.	5,000	6 00	....	....	
1858	Lockhaven	Pa.	28,000	—	—	Do.	3,000	4 00	....	....	
	Lockport	N. Y.	100,000	50	—	Do.	4,000	4 00	....	....	
	Logansport	Ind.	40,000		5	April & October.	5,000	4 00	105		But $481,400 stock has been sold. This Company has a large contingent fund and undivided profit on hand.
1838	Louisville	Ky.	600,000	50	6	January & July.	80,000	2 50	125	....	
1849	Lowell	Mass.	200,000	25	5	Do.	20,000	3 25	....	....	
1852	Lynchburg	Va.	70,000	25	5	Do.	6,000	3 80	....	....	
1852	Lynn	Mass.	55,000	50	4	Do.	20,000	4 00	....	....	
1850	Lyons	N. Y.	30,000	100	—	Do.	4,000	4 00	....	....	
1852	Macon	Ga.	75,160	25	6	Do.	5,000	5 00	....	....	
1851	Madison	Ind.	160,000	25	3	Do.	10,160	3 50	....	....	
1855	Madison	Wis.	100,000	25	—	Do.	5,000	5 00	....	....	
1854	Malden & Melrose	Mass.	50,600	25	3	February & August.	5,000	4 00	....	....	
1852	Manayunk	Pa.	40,000	100	—	Do.	7,000	4 00	....	....	
1852	Manchester	N. H.	100,000	100	5	January & July.	25,600	3 00	....	....	
1830	Manhattan (N. Y. City)	N. Y.	4,000,000	50	5	Do.	600,000	2 50	....	....	
	Mansfield	O.	25,000	—	—	Do.	10,000	4 00	....	....	
1854	Marblehead	Mass.	40,000	100	3	Do.	1,000	4 00	....	....	
	Marlboro'	Mass.	20,000	—	—	Do.	8,000	4 00	....	....	
	Mauch Chunk	Pa.	50,000	50	—	Do.	7,000	4 00	....	....	
1857	Marietta	O.	50,000	50	—	Do.	7,000	4 00	....	....	Stock firm.
1860	Marion	O.	12,000	25	5	April & October.	1,500	13 55	....	....	
1858	Marysville	Cal.	50,000	100	—	January & July.	4,000	2 50	....	....	
1857	Massilon	O.	20,000	25	—	Do.	5,000	3 00	....	....	
1855	Meadville	Pa.	39,500	25	—	Do.	4,000	3 50	....	....	
	Medina	N. Y.	2,000	100	—	Do.	2,000	7 00	....	....	
1852	Memphis	Tenn.	300,000	100	5	June & December.	12,000	3 50	....	....	
	Meriden	Ct.	20,000			Do.			....	....	
1859	Metropolitan (N. Y. City)	N. Y.	1,000,000	100	—	January & July.	200,000	2 50	....	....	
1859	Middleboro'	Mass.	15,000	—	—	Private Works.		6 00	....	....	
1858	Middletown	Ct.	50,000	25	3	March & September.	5,000	3 80	....	....	Owned by G. T. Sutton.
	Middletown	N. Y.		25	—	Private Works.	8,000	3 00	....	....	
	Milford	Mass.	20,000	—	—	Do.		4 00	....	....	
	Milledgeville	Ga.	100,000	50	—	Do.		5 00	....	....	
	Milton	Pa.	10,000			Do.			....	....	
1847	Milwaukee	Wis.	400,000	50	5	January & July.	24,000	3 50	150	....	
1852	Mobile	Ala.	200,000	—	—	Do.	30,000	4 50	....	....	
1836	Monroe	Mich.	40,000	50	—	Do.	5,000	3 50	50	....	
1852	Montgomery	Ala.	100,000	25	4	February & August.	7,000	6 00	....	....	
1856	Montpelier	Vt.	30,000	25	3	January & July.	5,000	4 50	....	....	
1859	Morrisania	N. Y.	30,000	50	—	Do.		4 00	....	....	
1859	Morristown	N. J.	18,000	50	—	Do.	3,500	4 00	....	....	
1854	Mount Holly	N. J.	16,650	25	3	April & October.	2,000	7 00	....	....	
	Mount Vernon	O.	50,000	100	—	Do.		4 00	....	....	
1857	Muscatine	Iowa.	50,000	100	—	January & July.	3,000	4 50	...	....	
1854	Nantucket	Mass.	50,000	100	3	February & August.	6,000	4 00	....	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1852	NASHUA	N. H.	45,000	50	3½	January & July.	10,000	3 50	....	....	
1850	NASHVILLE	Tenn.	200,000	50	5	Do.	25,000	3 50	....	....	
1858	NATCHEZ	Miss.	46,000	50	—	Do.	20,000	5 00	....	....	
	NEVADA CITY	Cal.							....	....	
1852	NEW ALBANY	Ind.	200,000	50	3½	Do.	16,000	3 50	....	....	
1846	NEWARK	N. J.	362,000	50	5	Do.	45,000	3 62	130	....	Always a favorite stock.
1856	NEWARK	O.	30,000	100	—	Do.	7,000	5 40	....	....	
1852	NEW BEDFORD	Mass.	130 000	100	5	Do.	15,000	2 90	102	....	Well managed and kept quiet.
1859	NEWBERN	N. C.	22,000	100	6	Do.	6,000	3 50	....	....	
	NEW BRITAIN	Ct.	30,000	20	5	Do.	3,000	4 00	....	....	
1851	NEW BRUNSWICK	N. J.	100,000	20	4	Do.	8,000	3 00	115	....	
1852	NEWBURG	N. Y.	67,000	20	4	Do.	10,000	4 00	105	....	
1852	NEWBURYPORT	Mass.	150,000	10	4	Do.	9,000	4 00	92½	....	
1857	NEWCASTLE	Del.	32,300	10	3	Do.	4,000	4 00	90	....	
1847	NEW HAVEN	Ct.	250,000	25	4	Do.	30,000	3 00	155	....	None in market.
1853	NEW LONDON	Ct.	70,000	50	3	Do.	12,000	4 00	105	....	
1835	NEW ORLEANS	La.	1,500,000	100	6	Do.	120,000	4 00	180	....	
1858	NEWPORT	R. I.	180,200	100	4	Do.	10,000	3 50	112	....	
1854	NEWTON & WATERTOWN	Mass.	300 000	100	2	Do.	10,000	4 00	....	....	
	NEWTON	N. J.	30,000	—	—	Do.	3,000	4 00	....	....	
	NEWTON	Pa.	20,000	50	—	Do.	2,500	4 00	....	....	
	NEWTOWN	N. Y.									
1823	NEW YORK	N. Y.	1,000 000	50	5	May & November.	100,000	2 50	300	....	
1859	NIAGARA FALLS	N. Y.	15,000	25	—	Do.	3,000	4 00	90	....	
	NORFOLK	Va.	60,000	25	—	Do.	40,000	4 00	....	....	
1853	NORRISTOWN	Pa.	41,700	25	4	June & December.	8,000	3 50	....	....	
1855	NORTH ATTLEBORO'	Mass.	50,000	100	3½	Do.	6,000	4 00	....	....	
	NORTHERN LIBERTIES	Pa.	400,000	25	7	City Works.	40,000	2 50	....	....	
	NORTH ADAMS	Mass.	25,000	—	—	March & September.	30,000	4 00	....	....	
1856	NORTHAMPTON	Mass.	35,000	25	3	January & July.	4 500	4 00	....	....	
1859	NORTH BRIDGEWATER	Mass.	16,000	100	4	June & December.	1,000	7 00	....	....	
1856	NORWALK	Ct.	30,000	150	4	February & August.	6,000	4 00	....	....	
1859	NORWALK	O.	30,000	25	—	January & July.	4,000	4 00	....	....	
1854	NORWICH	Ct.	75,000	25	2½	Do.	12,000	3 50	....	....	
1861	NORWICH	N. Y.	12,000	50	—	Do.	2,500	4 00	....	....	
1859	NYACK	N. Y.	20,000	100	—	Do.	2,500	4 00	....	....	
1860	OBERLIN	O.	10,000	—	—	Do.	1,200	4 00	....	....	
1855	OGDENSBURG	N. Y.	75,000	50	5	Do.	9,000	4 00	....	....	
1859	ORANGE	N. J.	65,000	25	—	Do.	6,000	3 50	....	....	
1852	OSWEGO	N. Y.	81,250	100	3½	Do.	15,000	4 00	105	....	Good works, built by Hoy, Jr., & Kennedy.
1855	OTTAWA	Ill.	45,000	100	6½	Do.	6,000	4 00	....	....	
1856	OWEGO	N. Y.	40,000	50	3½	Do.	5,000	4 00	....	....	
1860	OWENSBORO'	Ky.	25,000	25	—	Do.	4,000	3 50	....	....	
1856	PADUCAH	Ky.	75,000	100	—	May & November.	4,000	5 00	....	....	
1861	PAINESVILLE	O.	40,000	25	5	Do.	2,500	5 00	....	....	
1856	PALMYRA	N. Y.	12,000	25	—	January & July.	3,000	7 00	....	....	
1847	PATERSON	N. J.	125,000	25	3	Do.	20,000	3 50	95	....	
1850	PAWTUCKET	R. I.	75,000	50	4	Do.	12,000	3 00	....	....	
1855	PEEKSKILL	N. Y.	31,000	50	3	June & December.	4,000	4 00	....	....	Surplus $10,000, May 15, 1863.
1860	PENN YAN	N. Y.	12,000	50	5	Do.	3,000	4 00	....	....	Works leased to Gilbert T. Sutton.
1859	PEOPLES', CHICAGO	Ill.	500,000	50	New	Do.	100,000	2 50	....	....	
1855	PEORIA	Ill.	100,000	50	4	Do.	8,000	3 50	....	....	What is this Company doing?
1852	PETERSBURG	Va.	120,000	—	5	January & July.	20,000	3 80	....	....	
1841	PHILADELPHIA	Pa.	3,000,000	50	—	City Works.	650 000	2 00	....	....	
1855	PIQUA	O.	50,000	50	—	January & July.	6,500	4 00	....	....	
1835	PITTSBURG	Pa.	300,000	100	5	Do.	60,000	1 50	115	....	
1854	PITTSFIELD	Mass.	50,000	100	5	Do.	4,500	4 00	....	....	
1858	PLACERVILLE	Cal.	30,000	50	—	Do.	4,500	10 00	....	....	
1860	PLAINFIELD	N. J.	25,000	50	—	Do.	2,500	4 00	....	....	
1859	PLATTSBURG	N. Y.	16,000	50	—	January & July.	5,000	7 00	....	....	
1858	PLYMOUTH	Mass.	40,000	100	—	April & October.	8,000	4 00	....	....	
1860	PORT CHESTER	N. Y.	50,000	50	—	Do.	4,000	4 00	....		
1860	PORT JERVIS	N. Y.	20,000	100	—	Do.	3,000	4 10	....	....	
1849	PORTLAND	Me.	300,000	50	4	January & July.	30,000	3 00	....	....	
1859	PORTLAND	Oreg.	50,000	50	—	Do.	3,500	8 00	....	....	
1859	PORT LAVACCA	Texas.	50,000	100	—	Do.	2,500	7 00	....	....	
1851	PORTSMOUTH	N. H.	70,000	100	8	April & October.	6,500	3 70	....	....	
1855	PORTSMOUTH	O.	50,000	50	4	January & July.	10,000	3 50	....	....	
1855	PORTSMOUTH	Va.	100,000	50	4	Do.	4,000	4 00	....	....	
1856	POTTSTOWN	Pa.	20,000	50	3	Do.	3,500	4 00	....	....	
1850	POTTSVILLE	Pa.	110,000	50	2	Do.	10,000	3 50	....	....	
1850	POUGHKEEPSIE	N. Y.	84,000	25	4	March & September.	15,000	3 50	120	110	
1848	PROVIDENCE	R. I.	1,000,000	50	4	January & July.	60,000	3 00	122	....	
1853	QUINCY	Ill.	300,000	50	4	June & December.	12 000	3 50	....	....	
	QUINCY	Mass.	00,000	00	—	Do.	00,0. 0	0 00	....	....	
1855	RACINE	Wis.	43,500	26	—	Do.	7,000	3 50	....	....	
1857	RAHWAY	N. J.	50,000	20	—	January & July.	5,000	4 00	....	....	
1858	RALEIGH	N. C.	25,000	100	6	May & Novrmber.	5,000	6 00	....	....	
1848	READING	Pa.	100,000	25	4	January & July.	25,000	3 00	....	....	
1851	RICHMOND	Va.	841,975	—	—	City Works.	30,000	3 00	....	....	Jeff. Davis has extinguished the gas-lights of Richmond, Va.
1859	RICHMOND	Mass.	40,000	25	—	January & July.	3,000	4 00	....	....	
	RICHMOND COUNTY	N. Y.									
1859	RIPLEY	O.	25,000	50	—	April & October.	2,000	4 00	....	....	
1852	ROCHESTER	N. Y.	200,000	50	5	January & July.	50,000	2 50	....	....	
1857	ROCKFORD	Ill.	40,000	50	—	Do.	4,000	4 00	....	....	
1854	ROCK ISLAND	Ill.	100.000	50	—	Do.	6,000	4 50	....	....	
1854	ROCKLAND	Me.	50,000	100	—	Do.	6,000	4 40	....	....	
1852	ROME	N. Y.	35,000	100	3½	Do.	10,000	3 60	....	....	
1854	RONDOUT and KINGSTON	N. Y.	65,150	20	3½	June & December.	10,000	3 80	....	....	
1854	ROXBURY	Mass.	150,000	100	5	January & July.	20,000	3 50	....	....	
1859	RUTLAND	Vt.	20,000	25	—	Do.	4,000	3 50	....	....	
	SACO	Me.	71,600	100	3½	April & October.	8,000	4 00	....	....	
1857	SACRAMESTO	Cal.	500,000	100	—	Do.	40,000	10 00	....	....	
1859	SAG HARBOR	N. Y.	20,000	—	—	Do.	4,000	4 00	....	....	
1858	SAINT ALBANS	Vt.	15,000	20	—	Do.	3,000	7 00	....	....	
	SAINT JOHNSBURY	Vt.	30,000	25	—	Do.	4,000	4 00	....	....	
1857	SAINT JOSEPH	Mo.	50,000	100	5	January & July.	6,000	5 00	....	....	
1859	SAINT LOUIS	Mo.	600.000	50	—	June & December.	180.000	3 50	....	....	
1857	SAINT PAUL	Min.	200,000	50	3	January & July.	10,000	6 00	....	....	
1856	SALEM	N. J.	30,000	25	3	Do.	5,000	3 86	....	....	
1850	SALEM	Mass.	200,000	100	4	February & August.	30,000	3 24	....	....	
1859	SALEM	O.	25,000	20	—	Do.	3,000	3 00	....	....	
1859	SALISBURY	N. C.	14,600	50	6	May & November.	3,500	6 60	....	....	
	SALISBURY MILLS	Mass.	1,250	25	—	Do.	3,000	4 00	....	....	
	SALMON FALLS	Me.	25,000	100	—	Do.	3,000	4 00	....	....	
	SAN ANTONIO	Texas.	75,000	20	—	Do.	40,000	6 00	....	....	
1854	SANDUSKY	O.	75,000	50	—	April & October.	9,000	3 00	....	....	
1859	SANDWICH	Mass.	10,000	—	—	Private Works.	2,000	3 50	....	....	
1852	SAN FRANCISCO	Cal.	2,000,000	100	4½	Do.	100,000	6 50	100	....	
	SAN JOSE	Cal.							....	....	
1853	SARATOGA SPRINGS	N. Y.	39,000	100	—	January & July.	6,000	3 60	70	....	
	SAUGRETIES	N. Y.	30,000	20	—	Do.	4,000	3 00	....	....	
1849	SAVANNAH	Ga.	200,000	25	5	Do.	10,000	3 75	....	....	
1851	SCHENECTADY	N. Y.	50,000	—	—	Private Works.	11,000	4 00	....	....	
1858	SCRANTON, Gas and Water	Pa.	100,000	25	—	January & July.	6,000	3 80	....	....	About trying Water-Gas.
1857	SELMA	Ala.	20,000	100	—	Do.	2,000	5 00	....	....	
1856	SENECA FALLS AND WATERLOO	N. Y.	80,000	50	3	Do.	10,000	4 00	100	....	
	SHREVEPORT	La.	40,000	25	—	Do.	3,000	0 50	....	....	
1856	SING SING	N. Y.	40,000	100	—	Do.	3,000	3 50	....	....	
	SMYRNA	Del.						4 00	....	....	Petroleum Gas.
1860	SOUTH ADAMS	Mass.	10,000	25	—	Do.	3,000	4 00	....	....	
1859	SOUTH BRIDGE	Mass.	5,000	25	—	Do.	4,010	6 00	....	....	
	SOUTH BOSTON	Mass.	200,000	50	—	Do.	60,000	3 25	110	....	
	SPRINGFIELD	O.	200,000	100	—	Do	20,000	3 50	....	....	
1854	SPRINGFIELD	Ill.	75.000	50	—	January & July.	10,000	3 50	....	....	
1848	SPRINGFIELD	Mass.	100,000	500	5	February & August.	10,000	3 60	140	....	
1855	STAMFORD	Ct.	6,250	25	5	April & October.	3,000	3 50	....	....	
1857	STATEN ISLAND	N. Y.	150,000	50	5	January & July.	26,000	4 00	95	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1859	Staunton	Va.	18,000	50	6	January & July.	4,000	7 00	....	....	
	Steubenville	O.	150,000	100	—	Do.	15,000	4 00	....	....	
	Stockton	Cal.	50,000	—	—	Do.	8,000	10 00		....	
1848	Syracuse	N. Y.	125,000	25	5	March & September.	25,000	3 00	112	....	
	Tamaqua	Pa.	40,000	25	—	Do.	3,000	4 00	....	....	
1859	Tarrytown and Irvington	N. Y.	70,000	50	—	January & July.	3,000	4 00	....	....	
1853	Taunton	Mass.	100,000	50	4	Do.	10,000	4 00	....	....	
	Terre Haute	Ind.	100,000	100	—	Do.	3,000	4 00	....	....	
	Thompsonville	Ct.	25,000	50	—	Do.	4,000	4 50	....	....	
	Tiffin	O.	25,000	20	—	Do.	4,000	4 00	....	....	
1853	Toledo	O.	100,000	50	3	Do.	8,000	3 50	....	....	
1847	Trenton	N. J.	100,000	20	4	Do.	15,000	3 42	....	110	
1848	Troy	N. Y.	200,000	100	4	June & December.	35,000	3 00	160	....	
1856	Urbana	O.	30,000	25	—	April & October.	3,500	4 00	....	....	
1849	Utica	N. Y.	80,000	100	4	Do.	22,000	3 60	....	....	
1853	Vicksburg	Miss.	66,000	50	—	March & September.	4,000	4 50	....	....	
1859	Vincennes	Ind.	25,000	100	—	January & July.	2,000	4 00	....	....	
1863	Virginia City.	N. T.					20,000				
1858	Walden	N. Y.	2,500	—	—	Private Works.	1,000	6 00	....	....	
1853	Waltham	Mass.	100,000	100	4	January & July.	3,000	4 00	....	....	
1857	Ware	Mass.	30,000	20	—	Do.	3,500	4 00	....	....	
1861	Warren	O.	30,000	50	—	Do.	4,000	3 00	....	....	
1854	Warren	R. I.	20,000	25	—	Do.	3,000	4 00	....	....	
1855	Washington	D. C.	500,000	20	5	Do.	50,000	2 61	150	148	
1859	Washington	N. C.	15,000	100	—	April & October.	1,500	6 00	....	...	
1848	Washington	Pa.	20,000	25	4	January & July.	4,000	3 00	....	....	
1854	Waterbury	Ct.	100,000	25	—	Do.	4,000	4 00	....	....	
1852	Waterford	N. Y.	12,000	25	—	Do.	4,000	4 00	....	....	
1852	Watertown	N. Y.	20,000	100	—	Do.	10,000	7 00	....	....	
1856	Watertown	Wis.	25,000	100	—	Do.	5,000	5 00	....	....	
1858	Wautoma	Wis.	30,000	50	—	Do.	3,000	4 50	....	....	
1857	Waverly	Miss.	20,000	100	—	April & October.	4,000	5 00	....	....	
1854	West Cambridge	Mass.	60,000	100	—	February & August.	10,000	4 00	....	....	
1852	Westchester	Pa.	100,000	25	2½	Do.	3,500	3 50	....	....	
	Westfield	Mass.	25,000	100	6	Do.	4,000	4 00	....	....	
	Weston	O.	20,000	25	—	Do.		5 00	....	....	
1857	West Point	N. Y.	50,000	—	—	United States Military	Academy.	2 00	....	....	
1853	West Troy	N. Y.	100,000	50	3	January & July.	10,000	3 60	85	....	
1850	Wheeling	Va.	75,000	25	6	Do.	12,000	2 70	....	....	
	White Plains	N. Y.	20,000	20	—	Do.			....	....	
1856	Wilkesbarre	Pa.	50,000	50	—	May & November.	4,000	3 33	100	80	
1850	Williamsburg	N. Y.	1,000,000	50	5	January & July.	60,000	3 00	....	....	
1858	Williamsburg	Va.	30,000	25	—	Do.	3,000	4 00	....	....	Camp-fires of the Union Army light up this place at present.
1857	Williamsport	Pa.	70,000	25	4	Do.	3,500	3 50	....	....	
1859	Willimantic	Ct.	12,000	—	—	Do.	2,500	3 50	....	....	
1853	Wilmington	N. C.	60,000	50	5	Do.	8,000	5 00	....	....	
1852	Wilmington	Del.	200,000	50	5	February & August.	20,000	3 00	....	....	
1854	Winchester	Va.	36,000	50	6	January & July.	5,000	4 00	....	....	
1861	Windsor	Vt.	20,000	25		Do.	2,000	6 00			Make Petroleum Gas.
	Woburn	Mass.	20,000	—	—	Do.	3,000	4 00	....	....	
1856	Woodstock	Vt.	10,000	50	4	Do.	4,000	6 00	....	....	
1853	Woonsocket	R. I.	82,600	100	4	April & October.	4,000	3 50	....	....	
1856	Wooster	O.	25,000	50	—	January & July.	6 000	3 00	....	....	
1849	Worcester	Mass.	160,000	100	5	Do.	15,000	3 50	....	....	
1855	Xenia	O.	40,000	50	—	Do.	3,000	4 00	....	....	
1854	Yonkers	N. Y.	75,000	50	3½	Do.	6,500	4 00	102½	....	
1849	York	Pa.	40,000	57	3	June & December.	10,000	3 50	....	....	
	Yorkville	S. C.	20,000	25	—	Do.	4,000	4 00	....	....	
1858	Ypsilanti	Mich.	20,000	50	5	February & August	6,000	14 00	....	....	
1850	Yreka	Cal.	30,000	100	—	Do.	2,000	0 00	....	....	
1848	Zanesville	O.	44,600	25	4	Do.	10,000	3 00	....	....	

GAS-LIGHT COMPANIES IN THE BRITISH PROVINCES OF NORTH AMERICA.

When Chartered.	Town.	Province	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1854	Belleville	C. W.	33,040	100	4	January & July.	1,200	5 00	....	....	
1854	Brantford	C. W.	32,000	100	2½	Do.			....	....	
	Brockville	C. W.	50,000	—	—	Do.	5,000	4 00	....	....	
	Chatham	N. B.	50,000	—	—				....	....	
1854	Charlotte Town	P. E. I.	50,000	100	5	Do.	3 000	3 50	....	....	
1857	Cobourg	C. W.	30,000	—	-	February & August.	4,000		....	....	
	Dundas	C. W.	30,000	—	—	Do.	6,000	4 00	....	....	
	Frederick	N. B.	50,000	—	—	Do.			....	....	
1843	Halifax	N. S.	160,000	40	7	May.	30,000	3 60	....	....	
1850	Hamilton	C. W.	125,000	40	5	March & September.	20,000	3 50	....	....	
1848	Kingston	C. W.	80,000	100	—	Do.	6,000	3 50	....	....	
1853	London	C. W.	100,000	20	5	May & November.	5,000	5 00	....	....	
1847	Montreal	C. E.	400,000	40	—	March & September.	110,000	2 80	....	113	Last sale at this figure.
1854	Ottawa	C. W.	40,000	40	5	Do.	5,000	4 50	....	....	
1859	Point Levi	C. E.	25,000	25	—	January & July.	4,000	3 50	....	....	
1859	Port Hope	C. W.	28,000	20	4	May & November.	4,500	3 50	....	....	
1847	Quebec	C. E.	200,000	200	4	January & July.	60,000	3 00	....	....	
1848	Saint Catherine's	C. W.	80,000	20	—	May & November.	7,000	4 50	....	....	
1859	Saint Hyacinthe	C. E.	15,000	20	—	Do.	4,000	4 00	....	....	
	Saint John	N. B.	170,000	85	4	June & December.	25,000	3 00	110	110	Sales at this figure.
	Saint John's	N. F.	50,000	—	4	Do.	30,000		....	....	
1858	Sorel	C. E.	14,000	20	4	Do.	4,000	3 00	....	....	
1848	Toronto	C. W.	400,000	50	—		50,000	3 00	....	....	This Co. pay a quarterly div. of 2 per ct.

GAS-LIGHT COMPANIES IN CUBA, MEXICO, SOUTH AMERICA AND NEW ZEALAND.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
	Callao	Chile.		—	—	January & July.	20,000	7 00	....	....	
	Cardenas	Cuba.	50,000	—	—	Do.	180,000	5 00	....	....	
1857	Compania Cubana	Hav'a.	500,000	500	10	Do.			....	....	
	Cienfugos	Cuba.		—	—	Do.	12,000	5 00	....	....	These four towns are lighted by the Compania Cubana of Havana.
	Guanabacoa	Cuba.		—	—	Do.	14,000	5 50	....	....	
	Regla	Cuba.		—	—	Do.	10,000	5 00	....	....	
	Trinidad	Cuba.		—	—	Do.	16,000	5 00	....	....	
	Guines	Cuba.		—	—	Do.			....	....	
	Guyaquil	S. A.	150,000	—	—	Do.	35,000		....	....	
	Havana	Cuba.	2,000,000	500	—	Quarterly.	200,000	5 00	....	175	
	Lima	Peru.	100,000	—	—	January & July.	150,000		...	...	
	Maranham (Chartered)			—	—	Do.			....	...	
	Matanzas	Cuba.	50,000	—	—	Do.	180,000	8 50	....	....	
	Mexico City	Mex.	550,000	—	—	Do.			....	....	
	Montevideo	S. A.	500,000	—	—	Do.			....	....	
	Para (Chartered)			—	—	Do.			...	....	
18 4	Rio de Janeiro	S. A.	1,000,000	500	7½	Do.	300,000	4 00	...	....	
	San Iago	Chile.	500,000	—	—	Do.	180,000	7 00	....	....	
1857	Saint Jago de Cuba	Cuba.	450,000	500	—	Do.	25 000	5 00	....	....	
	Valparaiso	Chile.	500,000	—	—	Do.	85,000	6 00	...	....	
	Vera Cruz	Mex	500,000	—	—	Do.			....	....	
	Vi le Clara	Cuba.	50,000	—	—	Do.			....	....	
	Auckland	N. Z.		—	—	Do.			....	...	

YOUNG'S PARAFFIN AND PARAFFIN OIL WORKS.

The following interesting description of Mr. James Young's oil-works we take from the London *Oil Trade Review:*

About fifteen or sixteen years since, a thick, dirty-looking oily fluid was observed flowing from the cracks in the sandstone roof of a coal mine at Alfreton, Derbyshire. The attention of Mr. James Young was directed to the circumstance by Dr. Lyon Playfair, and he made a number of experiments with a view of utilizing this liquid. These experiments resulted in the establishment of a factory for the production of lubricating and burning oils. After a short period, however, the supply failed, and the manufacture necessarily came to an end. This untoward termination led Mr. Young to reflect on the causes which had produced this natural petroleum, and to endeavor to ascertain whether it could not be obtained artificially. From its situation in the sandstone above the coal, Mr. Young was led to the conclusion that its production was dependent on the natural distillation of the coal by subterranean heat; and on investigation he found that by distilling coal at a low temperature, he obtained an oily liquid in large quantity. For the protection of this discovery he took out a patent, and immediately proceeded to establish works at Bathgate, Linlithgowshire—this locality having been selected on account of the existence of the Boghead coal mines in the immediate neighborhood. From this small beginning there has rapidly been developed one of the largest chemical factories in the kingdom, with works covering twenty-five acres of ground, and furnishing lucrative employment to upwards of 600 men.

The establishment of this factory furnishes a convincing reply to those pseudo-philanthropists who bewail the decline of simple pursuits requiring unskilled labor, and think that the developement of the manufacturing over the agricultural system is the bane of the country. When the paraffin works were first established at Bathgate, the village was chiefly occupied by hand loom weavers, whose average earnings amounted to about 6s. per week. These weavers have now become the intelligent workmen of the factory, their earnings having been trebled by the change; and even the unskilled laborers receive more than double the previous average earnings of the district.

The Paraffin Works are situated about a mile from Bathgate Station, on one of the railways which connect Edinburgh and Glasgow. From the numerous chimneys and the smoke arising from the many furnaces required for the distillation of the oil, the whole place forcibly reminds the spectator of the "black country" around Birmingham,—an illusion that the smoke-begrimed appearance of the workers materially tends to strengthen. In a journal devoted to practical and applied science, the æstheties of the subject are, however, out of place, and therefore I will proceed to describe the general details of the manufacture.

The Boghead coal, as it is brought to the works, is a dull hard cannel coal, in masses of considerable size. It is requisite, in the first instance, that these should be broken into small fragments, capable of being conveniently introduced into the retorts, and being readily and uniformly acted upon by heat. To accomplish this, the blocks are thrown between two revolving toothed cylinders, constructed on the same principle as those of a bone-mill. As these turn round, the teeth crush the hard masses of coal with a horid scrunching noise, which makes one shudder to think of the inevitable fate of workmen falling between them. This, however, is a contingency that cannot happen; for the opening into which the coal is thrown is purposely made so small that such an accident is impossible.

On passing down to a lower level, the crushed coal is seen falling out from between the rollers, and a small stream of water may be observed playing over it, to prevent, as far as practicable, the inhalation of the dust by the workmen.

The crushed coal is then laden into large barrows, which are immediately run upon a hoist that raises them to a level with the tops of the retorts. Arrived at this point, a self-acting break prevents their return.

The retorts for distilling the coal are perpendicular tubes eleven feet in height, four of them constituting a set. These are built into one furnace, and charged by a single workman. The upper ends of the retorts, which project considerably above the platform formed by the top of the furnaces, are each closed by a conical hopper resembling a common funnel without its narrow tube; the opening of the hopper into the retort is closed by a spherical valve, which is suspended in the retort and pulled up against the opening by a chain worked by a counterpoise. This simple contrivance is rendered sufficiently air-tight by a handful of sand being thrown into the hopper. When it is wished to re-charge the retort, the workman fills the hopper with the broken coal, and then depressing the iron chain, lowers the spherical valve, when the contents of the hopper fall into the retort, the opening being immediately closed again and luted by a fresh handful of sand. From the construction of the retort, the coal is gradually heated as it descends to that part of the tube which passes through the furnace.

On passing down from the elevated platform formed by the range of furnaces, we arrive at the bottom of the upright retorts. These pass completely through the furnaces, and are closed below by dipping into shallow pools of water, that form air-tight joints. The advantage of this arrangement is evident: the spent coal from which the oil has been driven off as it passes through the hot part of the retort gradually descends into the water, and is from time to time raked away below, the coal from above descending as it is removed. Thus the action of these retorts is continuous, and the distillation goes on uninterruptedly both night and day. The waste refuse or spent coal from the retorts consists of about one-half carbon, the remainder being mineral matter. As it is not well adapted for fuel, nor utilized in any way, it accumulates in enormous mounds that cover several acres near the works. One of these accidentally caught fire some time since, and continued smouldering for more than twelve months before it burnt itself out. The vapors which are produced in the retorts are all conducted by iron tubes to the main condensers. These, like the ordinary condensers in coal-gas works, consist of a series of iron syphon pipes freely exposed to the air. In passing through these pipes, the vapors condense into liquid, a very inconsiderable portion escaping into a gas-holder as incondensible gas.

It is this result, so different from that obtained in the ordinary gas-works, that marks the great value of Mr. Young's process. In the gas-works, a high temperature resolves the coal into incondensible gas and coal tar, the latter being a liquid heavier than water. In the Paraffin Works, a comparatively low temperature, gradually applied, furnishes an inflammable oil lighter than water, with so small a portion of incondensible gas that practically it is of little consideration.

The crude oil produced in the numerous stacks of furnaces by the distillation of the Boghead coal is conveyed by means of iron pipes to a general reservoir: this is a brick tank sunk in the ground, and capable of containing 40,000 gallons. This crude oil is a mixture of various substances, some of which are very volatile, and give off inflammable vapors even at the ordinary temperature of the atmosphere. In order to guard against fire, this tank is covered by a low sheet iron roof, in the gable end of which there are two iron doors; these are not hinged, but drop like an ancient portcullis, being held open by long iron bars, so that should the liquid in the tank become ignited by any accident, the workmen, by pulling away the iron supporting rods, could drop the doors, and so enclose the ignited oil in an air-tight chamber; and, as if to make assurance doubly sure, a pipe from one of the largest steam-boilers in the works is carried through the roof, and a jet of steam can thus, at a minute's notice, be caused to play on the surface of the oil and assist in extinguishing the combustion.

In this the more open part of the works are situated the tanks for the storing of the refined oil. These are circular iron vessels, covered with conical roofs; in size they greatly surpass the neighboring cottages, and present somewhat the appearance of ordinary gasometers, without the surrounding framework. These tanks were constructed in the first instance of cast-iron plates connected by screws passing through the broad flanges surrounding each plate. So great, however, is the penetrative or diffusive power of the paraffin oil, that it is found impossible to render the joints tight by screws, consequently rivited wrought-iron tanks are now employed as reservoirs. Each of these tanks is capable of holding about 100,000 gallons of oil. At the time of my visit the aggregate quantity of oil in stock amounted to about 1,000,000 gallons,—a quantity sufficient to dispel the darkness in many hundreds of thousands of homes during the ensuing winter.

The crude oil as first obtained from the coal is a dark-colored thick liquid, containing all the products of its destructive distillation. The first process of purification it undergoes is simple distillation. This is performed in cylindrical iron stills of enormous size, weighing about five tons each; in these it is distilled to dryness, the superabundant carbon that it contains being left in the form of a shining black coke. As it is necessary to clear out this coke after each distillation, the retorts are made to open at the ends, so as to admit of its removal. The coke, which is as nearly as possible pure carbon, is employed as fuel in some of the numerous furnaces of the works. From the necessity of heating these stills to redness in order to drive off the whole of the oil, they are subject to a great amount of wear and tear: consequently, the cost of their replacement and repair constitutes an important item in the working expenses of the factory.

The vapor arising from the stills is cooled by being conducted along iron pipes passing through large open tanks sunk in the ground. These tanks have a very small stream of water flowing through them, which answers the purpose of keeping the pipes cool, the specific heat of the paraffin oil vapor being very small, and consequently requiring but a moderate amount of cold water to condense it into the liquid state.

When this first purification by simple distillation has been effected, the oil is further purified by being acted on by strong oil of vitriol, or sulphuric acid. As this, from its corrosive action, is a dangerous and therefore expensive material to convey, it is found more economical to produce it on the spot. Consequently, the Bathgate works include a complete apparatus for its manufacture: there are furnaces in which large quantities of sulphur are burned; vast leaden chambers, in which the fumes, mixed with those arising from nitre, are condensed into the liquid acid; and huge glass evaporating pans bedded in sand, in which the produce is concentrated by heat until it attains the required strength, which is indicated by the specific gravity of 1.848.

In order to insure an adequate mixture of the paraffin oil and the sulphuric acid required to purify it, both are allowed to flow in the requisite proportions into circular tanks. Each of these contains a revolving stirrer, which throws the whole into great commotion, and causes the intimate mixture of the two liquids, spite of their different specific gravities, the acid being double the weight of the oil. This admixture is continued for about four hours, when the combined fluids assume a beautiful opaque green appearance. On being allowed to rest, the impurities, which are charred and separated by the action of the oil of vitriol, subside to the bottom in the form of a dense, black, heavy acid tar. As this is not turned to any practical use, it is requisite to get rid of it in some way, as it cannot be allowed to pollute the neighboring streams, and its accumulation would be very inconvenient; it is necessary therefore to boil it to dryness, when the solid residue is used as fuel.

In order to separate the remaining impurities and that portion of the sulphuric acid which is left in the paraffin oil, it is next subjected to the action of a strong solution of caustic soda. This chemical reagent is also prepared at the works, a regular soda factory being in constant operation. This soda is rendered caustic by quicklime; and after having been used to purify the oil, is again worked up and re-used over and over again.

As thus purified, the oil contains four distinct commercial products, that require to be separated from each other in order that each should be made available for useful and economical purposes. To effect this separation, the oil is again distilled. The first elevation of temperature drives over the lighter and more volatile portions; these are collected separately, and, when purified by a subsequent distillation, yield on condensation the fluid known as naphtha. This naphtha, however, differs essentially from that obtained

from coal tar; the paraffin naphtha having a specific gravity of .750, whereas that prodcured from coal tar has a specific gravity of .850. The paraffin naphtha is of great value as a substitute for turpentine, and as a solvent for India rubber. It is also largely used in those naphtha lamps in which the fluid descends down a long pipe from an elevated reservoir, and being converted into vapor by passing through the heated burner, jets out into a star-like flame. These lamps, from not requiring a glass, nor being extinguished by a powerful current of air, are much employed by costermongers, and workmen in railway tunnels and similar localities.

From its great volatility, the naphtha does not require for its evaporation the heat of an open fire; it is therefore finally distilled in a separate house devoted to the purpose, the heat being furnished by the steam from a boiler situatedoutside the building. On the perfect separation of the lighter and more volatile naphtha depends the safety of the burning oil. The freedom from danger which has always characterized Young's paraffin oil, shows the care with which this precaution has always been observed at the Bathgate Works.

The burning or paraffin oil, which is the next product in point of volatility, comes over at a considerably higher temperature than the naphtha. Its properties are too well known to require a lengthened description. From the care with which the lighter naphtha is removed, the oil burns slowly and safely, and has a greater illuminating value than any other oil in the market.

The third product in point of volatility is the heavy oil used for lubricating purposes. This oil has been extensively used in the Lancashire factories in lubricating the fine machinery, and is preferred to sperm, on account of its superior lubricating qualities, safety against spontaneous combustion, and smaller cost. As originally obtained, the lubricating oil contains dissolved in it a very considerable proportion of solid paraffin.

In order to cause the crystallization of this paraffin from the heavy oils, a low temperature is requisite. As this occurs naturally only in winter, during the greater part of the year an artificial refrigerating apparatus became indispensable. Formerly a machine acting by means of ether was employed; but that has been entirely superseded by a most beautiful refrigerating instrument invented by Mr. Kirk, the resident engineer of the works. By this contrivance the necessity of employing expensive volatile liquids is entirely obviated, their place being supplied by atmospheric air. It is difficult to say which is most to be admired—the theoretical perfection or the practical efficacy of this instrument. The details of its construction would occupy too great a space in the present article; but the principle on which it acts is so simple, that it is readily explained. By the action of a piston working in an ordinary cylinder, a quantity of air is suddenly and forcibly compressed in a separate vessel. By this compression, the latent heat of the air is forced out, and its temperature instantaneously becomes very highly raised. The heat of the air, however, is rapidly abstracted by contact with the sides of the cavity, which are kept cold by a stream of water. The compressed air so cooled is then passed to the other extremity of the containing vessel, and permitted to expand. In doing this, it takes in an equal amount of heat to that which it had lost by condensation; and it abstracts this amount from the surrounding objects, cooling with great rapidity a stream of brine which flows through channels in the vessel. This stream of brine, which is much colder than freezing water, is employed to lower the temperature of the heavy oils down to that point at which the paraffin crystallises out.

Some idea of the efficiency of Kirk's engine may be gained from a consideration of the fact that a small model worked by hand will freeze mercury, and that the working machine at Bathgate produces a cooling effect equivalent to two tons of ice every twenty-four hours, at a very small expenditure of fuel. The heavy oils containing the frozen paraffin are next put into bags, when the oil drains away, leaving the solid paraffin. It is difficult to imagine any more beautiful substance than paraffin: in its liquid state it runs like water, looking brighter and more transparent than the neighboring trout-streams; as poured into the vessels in which it is to solidify, it produces the sound of falling water; and it possesses a high refractive power, that adds greatly to the beauty of its appearance. In a solid form, it is the most elegant of all the substances used for making candles; whilst in its illuminating power it surpasses even spermaceti itself—18½ lbs. of paraffin candles giving the same amount of light as 23 lbs. of sperm, 26 of wax, 29 of composite, and 36 of ordinary tallow. Hence, though dearer in first cost, when the actual illuminating power, long duration of burning, and whiteness of light are taken into consideration, it will be seen that they are cheaper than composite. One use of the paraffin candle-ends will commend them to the ladies of the household; a small piece of paraffin added to starch will be found to give a gloss and brilliancy of surface to the starched linen that can be attained by no other addition.

Having now passed in review the various stages of this important manufacture, little now remains to be said respecting the mode in which the paraffin oil is distributed. From the greater resistance of casks than of metallic vessels to accidental violence in transit, the former are obviously the best means of insuring its safe conveyance; but the diffusive power of the oil is so great, that it readily penetrates through the joinings of the staves. This inconvenience has been met in a very ingenious manner: each cask receives a coating of glue internally; this renders it quite impervious to the oil, so that the casks when in the possession of the retailer may be stored without the loss and annoyance of leakage.

The cooperage attached to the works is a large and extensive organization: not only are the casks made and glued, but there is a distinct department where those returned to the works are cleaned and re-glued; and there is even a machine for the purpose of scrubbing the exterior of each, so that on its re-issue it goes forth in a clean form that is not objectionable in any warehouse in which it may be located.

PETROLEUM ITEMS.

Iron *vs.* Wooden Casks for Petroleum.—On Thursday, a deputation of coopers waited upon the Liverpool Health Committee to express disapprobation of a recommendation which they understood the Committee to have made in favor of metal casks for the storage of petroleum. Mr. Bennett, who acted as spokesman of the deputation, said they understood that on September 19th certain rules had been suggested for the regulation of the storage of petroleum, and in the second of those rules they found a provision that, after March 31 next, no petroleum should be allowed to be stored in any but iron tanks, and good sound metal casks. By this provision wooden casks would be excluded from use. The deputation was convinced of the utility of wooden casks, and that they were not inferior, when well made, to those which were made of metal. As coopers, they affirmed that wooden casks could be made quite tight, and they were prepared to furnish a cask filled with petroleum to convince the Committee of the fact. Mr. Haydock asked whether, even if the casks were made air-tight, the petroleum would not leak through the wood. Mr. Bennett said this could not be, if the proper kind of wood were employed. The wood generally used was sometimes of indifferent quality. The deputation wished to impress upon the Committee the necessity of consulting those who had a practical knowledge of the subject before passing any laws affecting the trade. Dr. Trench said if the deputation could prove to the magistrates that wooden casks were sufficient to prevent either leakage or effluvia, both Mr. M'Gowen and himself would be glad to save the trade the expense of providing casks of other material. After some further conversation the deputation withdrew.—*Oil Trade Review.*

The Duration of the Petroleum Supply.—The all-absorbing question at present among those who are interested in the oil trade, is in relation to the duration of the supply of petroleum from the valley of Oil Creek, and whether the present amount of daily flow will be materially increased. At the present time, when a 1,000 barrel well is struck, the owners become millionaires in an incredibly short time. At $6 per barrel, which is now the ruling price at the wells, this would amount to the snug little sum of $6,000 per day. A short six or eight months has, with a few exceptions, been the average life-time of the flowing wells. The latter portion of their time of running is also marked by a decrease of at least three-fourths of the original flow. This, and the fact that all the wells struck have proved similar, is what tends to impair the confidence of many. Such conclusions as the above are doubtless correct so far as they go. But let us take a look at the reverse of this picture. We can see but little material difference in the amount produced twelve months ago and now. Oil was then selling for eighty to ninety cents per barrel at the wells. There had been some 450 wells bored upon Oil Creek, from the Sherman well to the mouth of the creek. The result of the new wells was to about keep up the supply of 7,000 barrels a day. The spring of the present year commenced with increased activity in the line of new wells. The high prices that had ruled the fall previous caused almost every one who could procure a lease to commence boring a well forthwith. The prevailing idea with many was, that in consequence of so many wells going down, oil would naturally rule very low in price during the season. But the reverse proved the case. At the most unpromising, or what has been so considered previous to this season of the year, oil ruled firm at $3 to $4 per barrel at the wells, and is now $6 per barrel.—*Oil City Register.*

New Mode of Storing Petroleum.—A model of a proposed plan for the storage of petroleum in the original casks, without leakage, and as a consequence removing the liability to smell, was recently shown at the office of Messrs. Holt & Banner, Sweeting street, Liverpool. Without going into details we may mention, that the leading features of the plan are the sinking of the original barrels in cisterns or tanks of water, so that they may always be submerged. The barrels are introduced into the wells by a shaft with the greatest facility, and when required can be easily recovered. The wood barrels being kept moist by the water, would, it is contended, swell them so as to render leakage impossible. The wells or tanks could be constructed of brick, or in any other way, so that they are capable of containing a sufficient quantity of water. So far as can be judged by the model, the plan appears to possess considerable merit, and is worthy of attention now that the question of doing away with the smell from petroleum is brought so prominently under public notice.—*Scientific American.*

A Coal-Oil Quarry.—At Santa Cruz, in California, there are over a thousand acres covered with a substance resembling asphaltum, from one to 10 feet thick, which is in reality a species of petroleum, easily melted, and susceptible of being purified and refined into excellent burning fluid.

The Petroleum Duty in France.—The communication from Messrs. Rossel, Fehr, & Co., published in the last issue of *The Grocer*, complaining of the treatment of English refined petroleum by the French Custom-house authorities, discloses a grevience that should, if possible, be at once disposed of. By the late treaty of commerce between England and France, English refined petroleum pays a duty of three francs per 100 kilogrammes, while American refined pays about six times that amount. Messrs. Rossel complain of the inconvenience they have suffered by the French Custom house authorities stopping and seizing their goods, which in some instances were actually accompanied by a certificate from the French Consul in London declaring them to be of British manufacture. From communications which we have received since the publication of Messrs. Rossel, Fehr & Co.'s letter, it is evident that they are not the only ones who have suffered from a like inconvenience. We would suggest that exporters should take immediate steps to remove the cause of complaint. Any concerted measure adopted with this object will have our warmest support.

Large Gas-Holder.—Messrs. Westwood & Wright, of Dudley, England, have just erected an enormous three lift gas holder for the City of London Gas Company. When full, this holder is 100 feet high, being five feet higher than the large holder at the Point Breeze works, of Philadelphia. Though severely tested by recent gales, this holder has been found to stand firm as a rock.

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month, and is the recognized official organ of

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Its purpose is to ascertain and make known all new discoveries in the science and economical application of LIGHT, and promote thereby the interests of companies and consumers; to encourage and aid the introduction of PURE WATER from Lakes and Rivers into Towns and Cities, and to improve the system of SEWERAGE, VENTILATION, HEATING, and DRAINAGE everywhere.

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ROOMS of the AMERICAN GAS-LIGHT JOURNAL,

No. 39 Nassau st., cor. of Liberty st., opposite the Post-Office.

New York City.

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THE

AMERICAN GAS-LIGHT JOURNAL,

PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

C. ELTON BUCK, ... EDITOR.

TUESDAY, DECEMBER 1, 1863.

The question of the supply of public lamps by meter, is now agitating the gas experts of England. From our foreign files we notice that the disputations concerning the propriety of adopting average meter indications, are going on with considerable acrimony. The *Sanitary Reporter* strenuously advocates the average system, while the *Journal of Gas-Lighting* takes the opposite course, and not only argues the case with vehemence, but with a disregard of the simplest rules of logic, drops all method in its remarks, and instead of confining itself to the plain question at issue, it eagerly grasps at outside matters, and descends to personalities and gross abuse.

On the subject of the supply of gas to public lamps by meter, there is but one opinion amongst the most enlightened engineers. They all admit it to be not only equitable, but go further, and assert it to be the only true method of establishing a perfect understanding between gas companies and municipal corporations. But very serious difficulties stand in the way of such an arrangement. The cost of a separate meter for every lamp-post, is one obstacle which the most ardent advocate of the use of meters cannot remove. To impose this great burden on gas companies, would be out of the question, while to expect the municipal authorities to assume the outlay, would be to raise a question at which tax payers would grumble, and political demagogues use as a lever for the cry of ruinous extravagance While the cost of meters remains at anything like the present average, there is very little hope of seeing this reform brought about. And yet it must be deplored that this should be the case.

In order to partially remove this great impediment, the average indication system has been proposed, and adopted to some extent in England. This is done by fixing a meter to one of a number of public lamps—say one in a dozen, or thereabouts—and averaging the consumption of all from the registration of the one meter. It is this plan which is now the point of contention above mentioned. Mr. SAMUEL HUGHES is an ardent advocate of this system, which is also approved by the new gas journal, the *Sanitary Reporter*. The gas engineers of England are very much divided on this question,—the majority, we believe, being against it. On the one hand it is urged that the results are such as to justify its exclusive adoption, while on the other, the complaints against it are loud and deep, and it is pronounced a failure. As a specimen of the manner in which the controversy is carried on, we extract an article from the *Sanitary Reporter*, which will be found on another page. The tone of this article, it will be seen, is severe, but none too much so, considering the provocation to acerbity, by the defiant, bullying manner in which the editor of the *Journal of Gas-Lighting* usually pens his diatribes.

A question may very naturally arise in considering this subject, whether the friction imposed by the meter may not cause a less quantity of gas to flow through the metered lamps, than passes through those with no meter attached? It is very well known that friction materially retards the flow of gas, or in other words, lessens its consumption. This subject demands a close investigation, for it may affect the whole question of average meter indications. If a meter be placed on one lamp in every twelve, and the consumption of the eleven unmetered lamps be calculated from the one with the meter attached, it is absolutely necessary that the flow of gas through all be alike, or else the test is not a fair criterion of the amount of gas consumed. If the friction of the meter be sufficient to retard the flow of gas through the burner to which it is attached, and no impediment be applied to the other eleven lamps, then the meter cannot be considered as a reliable indicator of the amount consumed, and the gas company supplying the lamps would be losers by the adoption of the system.

We shall watch the progress of this discussion as it extends among our English friends. It has occupied their attention for some time, and has called forth letters from a number of engineers, both for and against the average system. We hope some good may grow out of the controversy, and perhaps after a while, when the excitement passes away, we shall have some plan suggested by which public lighting may be made more satisfactory to all parties concerned.

REVIEW.

"GAS MANIPULATION, *with a description of the various instruments and apparatus employed in the Analysis of Coal and Coal-Gas. By* HENRY BANNISTER, *Chartered Gas Company, Westminster. London: 19 and 20 Marsham street, Westminster*, 1863."

Gas engineers have long felt the need of a practical work explaining the mode of making such analysis and tests as may be necessary in ascertaining the value of coals for gas-making, and the chemical purity and illuminating power of coal-gas. It is somewhat singular that so few treatises should have been written on this subject. We have quite a number of works on the manufacture of gas—some of them very good in their way—but all relating to the details of the manufacture without going enough into the minutiæ of the examination of gas after it is made, or laying down the few simple directions for ascertaining its practical value. The writings of Peckston, Clegg, Hughes, and others, have done much to light the path of the student in describing the general principles of the production of gas, but they have not imparted the full meed of information which the thorough engineer desires to know. The able and philosophical work of BUNSEN, which was translated by ROSCOE, is well fitted for the professional chemist, but is entirely too abstruse in its character to meet the wants of the gas engineer. For the latter, burdened with such cares as prevent a close application to the niceties, so to speak, of a complete analysis, a more practical work is needed to indicate the simplest methods of performing the necessary researches.

Gas engineers should be indebted to Mr. BANNISTER for the neat volume which he has written on this subject. The various analytical processes are described in a very lucid and concise manner, and a great amount of very valuable information is conveyed. Beginning with describing the mode of taking the specific gravity of coal, the experimental gas-works are then taken up. Respecting this apparatus, Mr. BANNISTER says: "In every large gas-works it now seems to be admitted that the apparatus is not complete without a small experimental retort, and apparatus, for the purpose of analyzing any sample of coal, the value of which, as a gas-producing agent, the manager may wish to know." This experimental apparatus is a luxury too seldom met with in gas-works of moderate size; consequently, to a great number of engineers the remarks concerning their management might seem superfluous. Not so, however. The description of these miniature works is given in a few words, and adds to the general interest of the work. The analysis of coal is explained in a very methodical way, and the engineer who reads this book with a desire to advance himself in his profession, cannot fail to receive much valuable instruction.

The general plan of the analysis of coal, as conducted by the author, may be briefly stated as follows:

To ascertain its specific gravity.

The quantity of gas it is capable of producing per ton reduced to the standard temperature and pressure.

The percentage { of hydro-carbon vapors condensable by bromine.
" " of carbonic oxide.
" " { of sulphuretted hydrogen present in the gas.
" " of carbonic acid.

The specific gravity of vapors condensed by bromine.

The specific gravity of the purified gas.

The weight, in pounds, of the gas produced from a ton of coal.

The quantity of ammonia or sulphur which may be present in the purified gas.

The illuminating power.

The quantity and value of ammoniacal liquor and tar.

The quantity and quality of coke.

From this it will be seen that the field of investigation described is a wide one. We can only say that the manner in which the successive steps are explained is very clear, and the author has carefully avoided the use of those expressions which might have rendered the book useful only to the professional chemist. The directions relating to photometry are especially worthy of commendation, and the chapter on gas-burners is full of information of the most valuable kind.

In this brief and hurried notice of this work we have not done it full justice. We can cordially recommend it to the attention of our engineering friends, and feel assured that they will be amply repaid for reading it. It ought to find a place in every gas-library, and take rank with other works, which, by the profession, are deemed indispensable. We congratulate Mr. BANNISTER on the meritorious character of his treatise, and hope he may find his efforts to elevate the profession, fully rewarded by an extended circulation.

ANSWERS TO CORRESPONDENTS.

C. S., of N. Y.—*The American edition is out of print. The English edition is published in precisely the style of the American at double the cost.*

J. J. C., of Mass.—*Try them, and we predict you will use no other.*

E. P. F., of Md.—*Your letters have been received and will be treated with due consideration. The subject is interesting and is well worthy of investigation.*

A. N., of Pa.—*The par value of the stock is* $50. *The last sales were effected at about* 105 *per cent. No security can be better, as the business of the company is large and increases appreciably every year.*

C. L. B., of Iowa.—*Your views cannot be sustained. The action of the company was perfectly legal, and would be sustained by any Court.*

GAS IN BRAZIL.—Ga-sworks are being built to light the city of Para, Brazil. Messrs. Westwood & Wright are engaged in constructing these works, which are rapidly approaching completion.

CORRESPONDENCE.

"COMPANIA CUBANA DEL A LUMBRADO DE GAS."

GUINES, CUBA, November 4th, 1863.

To the Editor of the AMERICAN GAS LIGHT JOURNAL:

A few details concerning the "*Compañia Cubana del a lumbrado de Gas,*" may not prove uninteresting to you.

This Company was incorporated in the year 1857, for 99 years, with a capital of $500,000 in 1,000 shares of $500 each, with the privilege of increasing it to $2,000,000. The object of the Company is, according to Chapter 1, Article 3, of their Rules and By-laws, "to make and sell purified gas in all the cities and towns of the Island in which it can be introduced with profit." Thus far, they have erected works in Cienfuegos, Trinidad, Regla, and Guanabacoa. To give you an inkling as to how they progress, I will give you a translation of a part of the report of the general secretary for the year ending December 31st, 1862. After felicitating the Company that the several works have had a happy time (*bastante feliz*) of it during the past year, and advising them of the *interesting* fact that there is in the treasury (*caja*) the amount of $32,138 08, while all their "*obligaciones*" amount to but $14,587 05, and that there is owing to the Company the sum of $24,862 53; he goes on to speak of the different works as follows:

Cienfuegos (which being interpreted means "hundred fires.)—The total cost of works up to December, 1862, was $153,450 15. No work for enlargement had been done during the year. For the coming year it is projected to extend the mains to the new prison, which extension will be beneficial for the works, inasmuch as it will increase the private consumption and the number of public lamps. There was no increase in these last during the last year, and for private consumption an increase of but six new customers.

Total production for gas, coke, &c., was $30,455 81; total expenses, $23,810 87, leaving a profit of $6,334 94, equal to 4 15-100 per cent. on its capital. Thus far the report. The writer was in Cienfuegos in July last, and if he recollects right, there were in operation five benches of threes, very much worn, and they had just completed five more benches of threes. Gasholder—about 50,000 feet—in very bad order, and were commencing another. Population about 11,000. Price of gas $5 per 1,000 feet. Cienfuegos is one of the most flourishing towns in Cuba, very handsomly built, very wide streets, and the most beautiful square that I have seen in the Island. The gas-works, with good management, must pay well.

Next comes the *Trinidad*, about which discourses the secretary in this wise: "Somewhat more consolatory is the situation of these works from what I indicated in my report of last year, and although on account of what I then told you, the stockholders authorized the Board of Directors to sell or rent them, we have not succeeded in doing either; for notwithstanding it was advertised in the newspapers of Havana and of Trinidad, we had not a single offer, and as the Directors found that matters were improving, they suspended their efforts to sell or rent. * * * The total production of the works was $21,726 35, the expenses being $19,473 01, the profits amounting to the sum of $2,253 34, instead of a loss of $800 which we had the year before. Total cost of works, $133,298,-49." Population 15,000.

Regla and Guanabacoa.—These two towns are supplied with gas from works situated in the former place, being about one league apart, and the latter situated on a high hill or series of hills, being frequently called the "City of the Hills," (*Ciudad de los Lomas*). These works were planned by Mr. John Harrison, formerly of the Manhattan, (I think) and are by far the best in the Island. Unfortunately Mr. Harrison did not stop to carry out his plans, for the gasholder that was intended to supply Guanabacoa was built in such a manner that it is a *fixture,* neither moving up nor down. I cannot give you the cost of these works. The number of consumers is 588 in both towns. Total production last year, $41,430 73. Expenses, including the repairs of a gasholder and purifiers, $27,183 31, leaving a net profit of $14,274 42, being 7 60-100 per cent. on the capital. These works will no doubt pay well in future if well managed. Unfortunately this is not often the case in this Island, the object seeming to be, not to secure the best talent, but the cheapest workmen. So much for the Compañia Cubana de Gas.

I forgot to say that the population of Regla is about 9,000, and Guanabacoa 17,000. Price of gas $5.

W.

SUPPLY OF PUBLIC LAMPS BY METERS.

We caution our readers not to believe one word of the statements which appear in the *Journal of Gas-Lighting*, relative to the public Lamps in Reading. The editor of that distinguished journal has no correct means of information, and is absolutely reduced to the degrading necessity of picking up dirty scraps of information which fall from the lips of ignorant and incompetent wotkmen. * * * * *

The editor's statements about the St. Ives meters are, as before explained, entirely at variance with the earlier returns received from Mr. Bower, in which he distinctly stated that the six meters consumed on the average 4,100 feet in 1,719 hours, giving 2.39 feet per lamp per hour. According to the editor's return, the quantity consumed is nearly doubled, but how about the hours of consumption? Do these remain the same, or is not the consumption quoted by the editor, that for the whole year? As we have already stated, before we can believe this new version from St. Ives we must see better returns from that town—more definite returns under the hands of the town clerk, the town surveyor, or some other local authority.

Mr. Bower must please himself about believing in the consumption of 2½ feet an hour at Reading. Those who ardently wish a given result are generally the most unwilling to believe the opposite. Mr. Bower, moreover, is a seller and not a buyer of gas, and has probably never tested the consumption of a public lamp-burner in his life. At the same time we have not a word to say against Mr. Bower, although we do object grievously to the inconsistency of his returns from St. Ives.

The writer of the *Circular* proceeds, in his usual style, to give extracts from some letters he has received from Worthing and Bolton, as to the meter system in operation there. Does he inquire from the local authorities, their surveyor, their clerk, or any other officer, whether the average meter system gives satisfaction? Oh! no, the editor cautiously avoids this, he thinks the consumers not the proper persons to inquire from, but he goes to the individual who is most of all aggrieved by the meter system, namely, the manager of the works, who, since the introduction of meters, can no longer lay the blame of his leakage and bad management on the public lamps. To this individual, thus intensely interested in condemning all attempts at measuring the gas consumed by the public lamps, the sagacious editor puts this *naïve* and primitive question, "Are you satisfied with the working of the system of charging for the public lights by the registration of one meter to twelve, or any greater number of lights?" Of course the editor knew perfectly well what the answer would be to this profound inquiry, but he perhaps did not know the stereotyped form in which it would come forth. The Bolton Oracle says, "decidedly not;" he of Worthington says, "*most* decidedly not." For our own part we should be very much surprised if either of these worthies *were* satisfied with the working of this or any other system, which strikes from under their feet the prop on which they had been accustomed complacently to lean for so many previous years. Oh, no! the meter system finds out what the public lamps really burn, prevents Mr. Manager from assigning the usual fabulous value to their consumption, and thus determines his leakage at a fixed and positive quantity, instead of a fluctuating and uncertain piece of guess-work.

But the editor's correspondent at Worthing goes on to show why the system is "most decidedly not" satisfactory to himself, and here is the reason: "We have *constantly* to complain of the light in the test lamps being smaller than the others. The lamps and meters being *locked* up by the Local Board, and the keys kept by them, we cannot get to them to test them." Poor, suffering, innocent Gas Company! What a horrible position to be placed in! Our readers, however, must take pattern by Mr. Bower, and simply disbelieve this very plausible statement. In the first place, every lamp at Worthing is, or ought to be, fitted with two taps, which, although not cast in one piece, like those used by Mr. Hughes at Reading, answer in reality exactly the same purpose, as they are all adjusted by the surveyor of the local board, in concert with the manager of the gas company, and after this adjustment the lamplighter has no control over them, and has only to turn his own tap full off and full on when required. Thus the gas company has all the protection of the double regulating tap, which has, on more than one occasion, received the entire approval of the editor who is making these minute and searching inquiries into the meter system. How is it possible, after the adjustment we have spoken of, that the light in the test lamps can be smaller than the others? If the adjustment have been carefully made, the lights *must* be the same; and if not carefully made, whose fault is it but that of Mr. Manager himself? The complaint, in fact, is so childish and absurd that it insensibly reminds one of a little episode in the life of children, which may be thus illustrated:

The complaining manager at Worthing is like a child of smaller growth, who has agreed with another child to share a piece of cake, the one to divide, the other to choose. Then, when the division and choice are both made on this clearly equitable principle, one of the children starts up and says, "You have a larger piece than I." Whatever may be thought of the logic and equity of this objection, it bears the closest analogy to the editor's Worthing manager, who, after consenting to the adjustment of all the lamps as perfectly fair, writes to his dear friend and counsellor, "We have *constantly* to complain," &c.

As to the meters being locked up, and the poor man not being able to get at them to test them, does he mean to say that he has ever expressed the smallest wish to have a meter tested, and that this has been refused by the local board? Perhaps, Mr. Manager thinks it very unfair that he should be debarred from the right of removing a meter when it registers less than appears to be proper. Of course we are no advocates for the locking up of meters by one party to the exclusion of the other, nor do we believe that any such practice prevails at Worthing. We should like to hear the explanation of this on the part of the local board, and doubtless it will be forthcoming in due time.

The return from the Bolton manager takes up a new ground of objection. In answer to the question, "Do you believe that the meters register accurately the quantity of gas consumed by the unmetered lamps?" the answer is, "No, some of the meters pass gas, *a portion of which does not get registered*, and at low pressure *there is no registration whatever.*"

When men connected with gas-works write such utter, helpless, unmitigated nonsense as this, what hopeless folly it is to combat their objections! If meters pass gas without being registered, how do they stand the test of the inspectors under the Sale of Gas Act? Again, one of the distinct directions for testing meters in that Act is, that every meter shall be tested, once with gas at a pressure of five-tenths or half an inch, and if not found to register at this very low pressure, is to be at once rejected. Does the manager at Bolton intend us to infer that the pressure in the street mains ever falls below half an inch, so as to render inefficient the testing of the meter inspector? Besides, the innate arrant absurdity of the whole answer, if it be an argument against average indication of meters, it is also an argument against entire registration by meters: it is, in fact, an argument against the use of meters at all, in all cases and under any circumstances. It is amusing to see how the writer of the *Circular*, conscious of the absurdity of the answer, tries to tone it down, and make it appear in some degree readable and plausible. He says (speaking, we presume, of non-registration at low pressure), "Such must always be the case *when there is any leakage*, for gas will pass through defects in the drum or in the diaphragm, or valves of the meters, when the consumption is small, as it must be with single jets." This, in other words, is saying, that when a meter leaks, some or all of the gas will pass through unregistered—a truism so evident that no sensible person would think of contradicting it any more than he would think of adducing it as a general argument against meters.

The writer does not seem to perceive that he here asserts something quite different from that which is said by his friend at Bolton, something, in fact, which has no bearing on any but diseased vicious meters, such as ought not to be fixed at all. The writer falls into the same error as his correspondent, and while directing his abuse against average meter indication, is really bringing forward arguments against whole meter indication; in fact, against meter registration of any kind. Neither his friends amongst the meter-makers, and least of all his own meter company, will thank him for revelations of this kind, which, in his mistaken zeal against average meter indication, he puts forth in this unguarded manner, striking at the root of meter registration of all kinds. Here he treads on dangerous ground, let him beware of the mine, which may explode beneath his feet!

Loughborough, Stirling, and Lincoln are quoted as places in which the meter system has been abandoned. With respect to the first two, we assert fearlessly that the system has not been fairly tried, and the same remark applies to all those towns where a consumption exists of anything like four feet an hour. Local authorities may learn from such examples that where they resolve to burn by meter they must not allow the control of these to remain with the gas companies, and still less must the lighting and extinguishing be left in the hands of the gas companies. It is also a most essential point that there shall be a uniform system of adjustment applied to all the lamps, whether metered or unmetered, and when these necessary and simple precautions are fairly carried out, not only will the average meter system be successful, but the saving will be quite as great as that which has been effected at Reading and Worthing.

At Lincoln, although meters are not now used, it is quite a mistake to suppose that the meter system has proved a failure. On the contrary, it has been a great success, for they have proved that 3¾ feet an hour gave an ample light for the public lamps, and when both the gas company and the local board were satisfied on this point, an amicable arrangement was come to, by which the company agreed to supply, and the board agreed to pay for, four feet an hour. The case of Lincoln only proves that the meters have been of great service, and there can be no doubt if one uniform system of adjustment had been adopted, as at Reading and Worthing, the saving would have been much greater. —*Sanitary Reporter.*

GAS IN ENGLAND.—The prospectus of a limited Nottingham and District Gas Consumers' Company has been issued. The capital will be £100,000, in £10 shares, deposit 10s. a share. The company has been projected by large consumers for the purpose of supplying the town of Nottingham and the surrounding district with gas of a purer and more brilliant character, and better adapted for manufacturing and domestic purposes, than that hitherto supplied; and at as low a charge as is attainable by the adoption of the most recent improvements in its manufacture, and consistent with a fair return for the capital employed. Calculations have been made that, charging for gas at a great reduction on the present scale, a dividend of £8 per cent. will be realized upon the shares; and although the maximum rate allowed by Parliament is £10 per cent., it is proposed to pay all money beyond £8 per cent. in aid of such rates in the town as may be afterwards determined upon.

At Esher gas-mains are to be laid from the town of Kingston, near by, which is to be supplied to consumers at 5s. 6d. per thousand cubic feet. The Kingston works have been recently enlarged, so that they will be able to meet this demand.

At Nottingham there is a project to start an opposition gas company, in order, says an exchange, to supply Nottingham and district with gas of a purer and more brilliant character, and better suited for manufacturing and domestic purposes than that hitherto supplied.

At Halifax, Mr. Wilton, the gas manager, has resigned his position.

At Stockport, the price of gas has been reduced from 5s. to 4s. 6d. per thousand cubic feet. The gas made by the Stockport Company is exclusively from cannel coal, and is 24 candles in illuminating power.

PAPERS ON HYDRAULIC ENGINEERING.

BY SAMUEL MCELROY, C. E.

No. 4.—City Sewerage.

[From the Journal of the Franklin Institute.]

(*Continued from page* 151.)

Analysis of Sewage.—In proper connection with the disposal of city sewage, the question of its nature in passing through the outlets becomes important.

An analysis of four prominent London sewers in the report of 1857, p. 8, gives the following result in grains of solid matter per gallon (Imperial), taken from the mouths of the sewers:

Constituents.	Earl.	Falcon Brook.	King's Scholars' Pond.	Total.
Organic..	2.738	3.987	17.75	16.117
Mineral.....	46.116	40.140	47.23	51.304
Total.....	48.848	44.133	64.98	67.421

As compared with six samples of Thames water, having an average of 2.039 grains organic and 23.281 grains mineral contents, the similarity is remarkable.

Another analysis of sewage flow, under the intermittent system of supply in London, where the water is let on three times a week, is as follows, in grains per gallon:

Constituents.	Ordinary Water Days.	Extra. Water Days.
Soluble matter.....	127	96
Insoluble "	40	28
Total.....	167	124

An analysis of two sewers given by Prof. Way, in the Report of 1850, App. 3, p. 136, makes the following subdivision of constituents:

DORSET SQUARE.

Constituents.	Soluble.	Insoluble.	Total.
Organic matter and salts of ammonia	57.32	23.00	80.32
Street sand and detritus.....	0.78	44.50	45.28
Soluble silica.....	1.16	12.09	13.25
Phosphoric acid....	2.53	1.64	4.17
Sulphuric "	0.28	8.63	3.91
Carbonic "	10.58	1.99	12.57
Lime.....	7.40	8.37	15.77
Magnesia.....	.07	Traces.	.07
Peroxide of iron and alumina..	Traces.	2.66	2.66
Potash.....	2.60	0.72	3.32
Soda.....			
Chloride of sodium.....	27.27	2.10	29.37
	109.00	100.70	209.70

BARRETT'S COURT.

Constituents.	Soluble.	Insoluble.	Total.
Organic matter and salts of ammonia.....	121.50	180.32	301 82
Street sand and detritus.....	1.39	19.30	20.69
Soluble silica.....	1.57	10.94	12.51
Phosphoric acid.....	7.71	2.73	10.44
Sulphuric "	10.71	4 02	14.73
Carbonic "	11.62	3.97	15 59
Lime.....	7.50	17.03	24.53
Magnesia.....	2.87	Traces.	2.87
Peroxide of iron and alumina...	Traces.	6.20	6.20
Potash.....	46.91	1.22	48.13
Soda	None.	1.51	1 51
Chloride of sodium.....	31.52	1.72	33.24
	243.30	248.96	492.26

An analysis of Edinburgh sewer water gives 62 grains in solution and 244 of solid matter in suspension.

It is stated in the report of 1850, that—

"In thoroughfares of considerable traffic in large towns, as in the main streets of the Metropolis, as much ordure is dropped on the surface of the highways as is deposited in the cesspools of the corresponding houses. Thus it is reported that the quantity of dung removed daily from a space of 68 acres of paved roadway surface, including the bye-streets of little traffic, as well as the crowded streets of the city of London, varied from 505 to 596 loads per week, or was on the average 92½ per day, nearly all of horse dung."

Samples of water taken from the street gullies, during a rain, gave, for ten specimens, an average of 113.34 grains of soluble and 149.25 grains of insoluble matter per gallon. There is, however, considerable difference between the samples, ranging from 44 to 276 grains soluble and 3 to 590 grains insoluble matter.

In these analyses there are considerable differences in results, which may be accounted for by relative completeness of sewer action, and relative stages of water supply, to a certain extent. The enormous Fleet sewer, 18.5 feet high by 12 feet wide at its mouth, does not operate uniformly, being a collector of deposit, rather than an outlet of ordinary sewage. Hence, an analysis, at its outlet, or in other sewers of its class, may not, even in storm floods, show a correct proportion of solid matter. As given, with that of several other sewers and systems of sewers, we have the singular conclusion that the city sewers are actually discharging purer water than the wells, which have been, and are even now, in general use in many of our cities. There are wells now in use, in Brooklyn and other places, kept up at the city expense, which contain more grains of solid matter per gallon, than the sewage flow of populous cities, in some cases, as here demonstrated.

The general conclusion to be drawn from this examination, and from the practical working of properly devised and constructed sewers, in such examples as the 227 cases illustrated in the London Report of 1855, and the experience of other European cities, and of Brooklyn, is this:—that the popular idea of difficult flow in sewage is entirely erroneous, and that the excessive proportions of city sewers in common use, are in no respect warranted by the laws of their daily operation.

Not only is it true then that all the soluble matters of sewage are readily taken up and carried off, as well as all matter held in suspension, by the large surplus of water, which of necessity enters the sewers, but it is also a matter of demonstration, that insoluble materials of considerable weight, are readily moved by the ordinary force of the sewer currents.

Experiments, given by Mr. Blackwell, in the Report of 1857, p. 168, App., on brick-bats, building stone, chalk, flints, coal, clinkers, copper slag, limestone, oyster shells, slates, nails, scraps of iron, gravel, and other materials, show that they were started from rest, with a current of 1.75 to 2.5 feet per second, and moved at rates from 1.25 to 2 feet per second, by currents from 4 to 4.25 feet, the latter being common velocities for pipes with gradients as low as 1 in 60.

Value of Sewage.—In the promotion of vegetation, the nitrogen, in the form of ammonia, with the subordinate properties of alkalies, phosphates, and sulphates, contained in manure, give it its agricultural value, and among manures, one of the best in quality, comes from a prominent constituent of house sewage. Eminent chemists have shown experimentally, that the nitrogen annually produced by one man, at 16.41 pounds, is sufficient for the supply of 800 lbs. of wheat, rye, or oats, or of 900 lbs. of barley, and it is estimated that each person in a community is worth, in this view, two pounds of bread per day.

The sewer discharge of the city of Milan, is artificially thrown over a large extent of meadow land, some of which, on this account, yields a net revenue of 40 dollars per acre.

By the same process in use in Edinburgh, lands formerly renting from 10 to 30 dollars per acre, now bring 150 to 200 dollars, 25 dollars per acre being estimated as the value of sewage water. It is also estimated there, that 560 pounds of dissolved and suspended matter contained in 17,920 gallons of sewage, are equal in fertilizing power to 280 lbs. of guano or 15 tons of farm yard manure, while the relative cost of application, and the material, is as $3.18 to $5 and to $15. About 150 acres are thus manured.

Experiments at Clitheroe, Lancashire, with 8 tons of sewage water on one acre, and 15 tons ordinary manure on another, gave a produce of 1.875 to 1, in favor of the former, as to quantities, and 1.875 to .532 as to weights.

The following analysis of human excrement is given by Mr. Laws, p. 392, App. London Report, 1857.

Pounds per head per annum; average for both sexes and for all ages:

Mineral matter.....	10.84 lbs.
Carbon.....	16.85 "
Nitrogen.....	7.94 "
Nitrogen ammonia.....	9.64 "
Phosphates.....	4.58 "
Total dry substance.....	49.95 "

Assuming that these constituents could be separated in a pure and dry state, the estimate of value is £15 per ton, or for 48 persons, 6 shillings per head. At this

rate London produces 51,635 tons, worth £774,525, or $3,872,625.

The fluid discharge is estimated an 2.5 lbs. per day, or 912 lbs. per year, per head.

The estimated value, based on an analysis of Prof. Way, previously given for 209.70 grains solid matter per gallon, as stated, p. 11, App. Report of 1857, for 100 tons of the solid constituents of the mean flow of London sewage, is as follows:

		£	s.	d.
7.982 tons	ammonia at £56	446	19	10
1.269 "	insoluble phosphate of lime at £7	8	17	8
2.631 "	soluble " " £32	84	3	10
1. "	potash at £31	31	0	0
80.110 "	organic matter at £1	80	2	2
57.008 "	no value	00	0	0
100.000 "		£601	3	6

It was farther determined that "at least six-sevenths of the constituents of sewage valuable for agricultural purposes, exist in the soluble portion, the suspended matter having a comparatively small value."

The value deduced for 100 tons of sewage (220 galls. per ton) is—

	lbs.	£	s.	d.
Suspended matter	82.72	0	2	2¾
Dissolved "	245.95	0	15	4¾
	328.67	0	17	7

Applying this value to the sewage of New York, on the consumption of 1861, about 44,000,000 gallons, or about 2,000,000 tons sewage per day, at 4.39 cents, for 365 days, would amount to $3,204,700 per year.

The city of Paris provides for the systematic removal of cesspool contents to the *Voirie* of Montfaucon; and the estimate of cost in 1850, for the removal of 230,000 cubic meters was $414,000. The income from the poudrette manufactured is not given for that year, but in 1843 was $105,000. It probably fell short, considerably, of the expense of removal. 80 to 90 per cent. loss is estimated for removal.

French chemists give the following comparative value of manures, as applicable to equal effects on one *hectare* (2.5 acres) of land:

	Kilogrammes.
Good farm dung	10,000
Human urine, unfermented	5,600
Poudrette of Montfaucon	2,550
Mixed human excrements	1,333
Liquid blood of the *Abattoirs*	1,333
Bones	650
Guano (average)	512
Human urine, in fermentation and incompletely dried	233

Sufficient evidence is adduced here of the intrinsic value of sewage matter, although in somewhat detached and contradictory form, as affected by local conditions and treatment; and there is force and wisdom in the language of Victor Hugo on this subject:

"All the human and animal manure which the world loses, if returned to the land instead of being thrown into the sea, would suffice to nourish the world. Do you know what those piles of ordure are, collected at the corners of streets, those carts of mud carried of at night from the streets, the frightful barrels of the night-man, and the fetid streams of subterranean mud which the pavement conceals from you? All this is a flowering field, it is green grass, it is mint, and thyme, and sage, it is game, it is cattle, it is the satisfied lowing of heavy kine at night, it is perfumed hay, it is gilded wheat, it is bread on your table, it is warm blood in your veins, it is health, it is joy, it is life. * * * * * * * Statistics have calculated that France alone pours into the Atlantic a sum of half a million. Note this; with these five hundred millions one-quarter of the expenses of the budget would be paid.* The cleverness of man is so great that he prefers to get rid of these five hundred millions in the gutter. The very substance of the people is borne away, here drop by drop, and there in streams, by the wretched vomiting of our sewers into the rivers and the gigantic vomiting of our rivers into the ocean. Each eructation of our drains costs us one thousand francs, and this has two results; the earth impoverished and the water poisoned; hunger issuing from the furrow and illness from the river."

(To be continued.)

[* This quotation from Victor Hugo is manifestly incorrect and badly translated. In Wilbour's translation, published by Carleton of this city, which is the *only* correct rendition of *Les Miserables* into English, this sentence is thus expressed:—"Statistics show that France alone makes a liquidation of a hundred millions every year into the Atlantic from the mouths of her rivers. Mark this; with that hundred millions you might pay a quarter of the expenses of the government," &c. In the translation quoted in the article of Mr. McElroy, "half a million" and "five hundred millions" are used to designate equivalent quantities, which is absurd.—Ed. Am. Gas-Lt. Jour.]

ON THE PROGRESS AND PRESENT STATE OF FIRE-CLAY GOODS MANUFACTURE.

By Joseph Cowen, Jun., Esq.

[Read before the British Association at Newcastle.]

Fire-clay is obtained in large quantities in the two counties of Durham and Northumberland. It usually lies beneath the coal measures in layers, varying in thickness from 12 inches to 5 or 6 feet. It is found in most abundance, and in the best quality, beneath the coal used for coking and manufacturing purposes. Silica and alumina are the two substances of which fire-clay is chiefly composed. The refractory character of any sample of fire-clay is determined by the proportions in which these two ingredients are contained, and by the absence of lime, iron, and other easily fluxible substances. The best descriptions of fire-clay, those which, when manufactured, are capable of resisting the greatest heat, always contain a large portion of silica. The following are a series of analyses of samples of fire-clay taken from seven seams, all worked in the mines belonging to one fire-brick manufactory, situated a few miles west of Newcastle:

	1	2	3	4	5	6	7
Silica	51.10	47.55	48.55	51.11	71 28	83.29	69.25
Alumina	31.35	29.50	30.25	30.40	17.75	8.10	17.90
Oxide of Iron	4.63	9.13	4.06	4.91	2.48	1.88	2.97
Lime	1.46	1.34	1.66	1.76			
Magnesia	1.54	0.71	1.91	trac.	2.30	2.99	1.30
Water and organic matter	10.47	12.01	10.67	12.29	6.94	3.64	7.58

From these analyses, it will be seen that clays of various kinds and qualities lay in close contiguity to each other, and can be worked out of the same mine. The possession of such a series of beds of clay so situated gives great facility to the manufacturers in this district, as it enables them to mix the different descriptions of clay, with a view of adapting the articles made therefrom to different purposes. This is a facility enjoyed by the northern fire-clay manufacturers to a greater extent than by those in any other part of the United Kingdom. Fire-clay being found in more abundance, and capable of being more economically worked, in the northern coal-field than in any part of Europe, accounts for the extent of the business in fire-clay goods in this district.

The trade in fire-clay goods is of comparatively recent origin. Its progress at first was slow, but, during the last forty years, it has extended rapidly, and is still on the increase. The extension during the last twenty-five years has been especially marked and important. Fire-bricks were first made on the Tyne about one hundred years ago.

For many years, all that were made were consumed in the manufactories in the neighborhood. Slowly but gradually, the trade increased, and the goods made were sent in larger or smaller quantities to different parts of the United Kingdom, and to some of the chief ports in Europe and the British colonies. The extent of the trade in 1838 was as follows: The number of bricks manufactured at that time per annum was about 7 millions. The local consumption then was about 2½ millions. The quantity sent to other parts of the United Kingdom was about 3 millions; and the quantity exported was about 1½ million. The extent of the trade at the present time is as follows:

Number of fire-bricks made per annum about	80,000,000
The local consumption is estimated at	43,000,000
The quantity sent to other parts of the United Kingdom is estimated at	27,500,000
And the quantity exported	9,500,000

It will be seen from the above figures that the local consumption of fire-goods has increased during the last quarter of a century 1,700 per cent., the home trade upwards of 900 per cent., and the export trade upwards of 600 per cent. The average increase has been about 1,100 per cent.

There has been very little alteration in the art of making fire-bricks, except in the construction of the moulds, which were at first made of wood, and are now made of brass or other metal, and some of glass. The way in which bricks are made at present does not differ materially from the way they were made a century ago. Repeated attempts have been made to apply machinery to their production, but, as yet, without success. The plastic nature of fire-clay, and the character and variety of the articles made from it, render the application of machine-power difficult, and the advantages derivable from its adoption comparatively trifling. In Wales, machinery has been used for making fire-bricks; but the fire-clay of that district differs in its nature from that got in the north of England. Machinery has, however, been very extensively and successfully applied to the preparation of the raw material. Indeed, had it not been for the improved mode of grinding and pugging the clay which machinery has supplied, it is doubtful whether the trade could have developed in the way it has done.

Great improvements have also been made in the manner in which various kinds of clay are mixed and prepared for manufacturing purposes. The exposure of fire-clay to the action of the weather has a most important and beneficial influence on its quality, as it separates the impure portions from the good clay, and enables them to be seen and picked out with ease. Those manufacturers who have capital and sufficient space to weather their clay effectively, and who are so favorably situated as to have at their command a variety of clays containing the essential ingredients in different proportions, have great facilities for preparing the materials and adapting them to make articles suitable for all purposes for which fire goods are used.

Forty years ago the manufacture of fire-goods was limited to making fire-bricks of the ordinary shapes and sizes. Since that time fire-clay goods have become much more generally used, and the articles made from fire-clay are both numerous and complicated. Articles intended for ornament, as well as goods designed for the most substantial works, have been alike constructed from it with success, and hence also its use as an article of commerce is daily increasing. Gas-retorts made of fire-clay have, within the last twenty years, gradually become adopted, and they are now generally in use in all gas-works. The improvement in the manufacture of this class of fire-goods has been very considerable. Great difficulties were experienced at first in making retorts of fire-clay of the required dimensions, and free from cracks, but as the trade extended, these difficulties decreased, and the demand for the article increased. The number of clay retorts now made in this district will be about 12,000 per annum.

The use of clay retorts by gas companies has destroyed the consumption of iron retorts, and caused a very considerable saving in the manufacture of gas. All large gas establishments have been enabled, by the use of clay retorts instead of iron ones, to considerably increase their profits. Some are understood to have been able almost to double their dividends through the change from iron to clay retorts. The use of clay retorts has, however, diminished the number of fire-bricks, tiles, and the various smaller kinds of fire goods formerly consumed by the different gas companies in setting their iron retorts.

Fire-clay pipes are now often used for lining chimneys in dwelling-houses, hospitals, &c. The use of such pipes as safeguards against fire cannot be too highly recommended. Fire-clay is also largely used for making chimney-tops, baths, flower vases, and other ornamental articles. Many of the common and lowest priced descriptions of fire-bricks are now used for ordinary building purposes, in the construction of dwelling-houses, warehouses, &c.

The great increase in the demand for fire-clay goods has been caused by the increase in the number of iron, gas, and alkali works, and the rapid and great extension of the trade for coke for locomotives. The price and quality of fire-goods vary considarable. Fire-bricks made of the inferior descriptions of clays, and manufactured in the least expensive way, are sold as low as 30s. per 1,000; while the best kinds, made from superior clays, and manufactured with the greatest care, are sold at 55s. per 1,000.

Fire-clay has, for some years past, also been used extensively in the manufacture of sanitary pipes, for which purpose it is well adapted. The smaller main sewers and branch drains in all new works are now made of glazed fire-clay or earthenware pipes. Clay pipes, although in their adaptation to drainage comparatively modern in their use, are yet of great antiquity, having been found in the ruins of Nineveh in a perfect state of preservation, where they appear to have been used for the conveyance of water to the various aqueducts in the city.

Fire-clay is found to be a more suitable material for the manufacture of sanitary tubes than either earthen-

ware or stoneware. The greater amount of heat that is required to vitrify it makes the pipes better burnt; while the thickness they are usually made increases their strength and durability, and at the same time enables them to resist the action of the chemical agents found in suspension in the liquid sewage.

At an early period of their manufacture, the old system of moulding these pipes in plaster moulds was abandoned, and a more expeditious method of making them was adopted, by the introduction of suitable machinery, in some cases propelled by hydraulic, but more generally by steam power. The usual form of a steam-pipe press is a simple cylindrical box, which, being filled with properly-tempered clay, has a ram or plunger working in it, which, being set in motion by the direct action of steam, admitted to the steam-chest by the moving of a handle, presses the clay to the bottom of the cylinder, through dies of various sizes. The socket and the pipe being made simultaneously at one blow, and the pipe being cut with a wire, is carried off on boards to stiffen; after which, a slight dressing by hand makes it ready for the kiln, where it is burned. The rapidity with which these pipes are made is very great—five men or boys being able to turn out about a mile of them in a day, from 3 to 6 inches in diameter, of 2 or 3 feet lengths; or a proportionate number of larger sizes. The highest bore these pipes have reached is 3 feet diameter, but these are very seldom used, being found more expensive than a brick drain of the same dimensions; but 18 inches diameter pipes and under are the sizes used most, generally for main and side drains. In addition to their cheapness, these pipes are found of almost universal adaptation, from their internal smoothness and cylindrical form. When properly laid and well-jointed, a fall of an inch in 1,000 yards will enable the sewage to flow through them without stagnation or interruption. These pipes are all glazed externally and internally with a powerful salt glaze.

By the use of glazed fire-clay and earthenware sanitary pipes, the drainage of a large number of places in the United Kingdom has been much improved.

In the counties of Durham and Northumberland, Darlington, Durham, Sunderland, North and South Shields, Morpeth, Alnwick, and other smaller places, have all been drained, chiefly by the use of fire-clay pipes, manufactured principally on the Tyne.

Although the larger portion of these pipes are used for the conveyance of subsoil drainage, they are also used in large quantities for the conveyance of water. They have been approved of by many water engineers for that purpose, as the proper description of pipe to be used where the pressure is not great, as by their use the evil accruing to the quality of the water by transmission in lead or metal pipes is entirely avoided. The pressure these pipes will sustain is very considerable: some manufactured on the Tyne have been tested and found to sustain a pressure of 80 to 120 lbs. on the square inch. This is a very fair pressure for a pipe manufactured of clay; but, as the manufacture progresses, it will, no doubt, go much beyond this. Glazed fire-clay pipes form a channel for the conveyance of water which never corrodes, and in its essential properties is imperishable.

Fire-bricks made per annum are estimated at	80,000,000	
Fire-clay retorts per annum, about	12,000	
Fire-clay glazed pipes made per annum, 3 in. to 15 in. diameter	175 miles.	
Fire-clay ground sold per annum, estimated at	50,000 tons.	
Fire-clay required to make the above bricks, retorts, and pipes, estimated at	295,000	"
Coals required in the manufacture of the above, estimated at	150,000	"
Men and boys employed, estimated at	3,500	
Amount of wages paid per annum in the northern fire-clay works, estimated at	£110,000	
Fire-bricks used in the locality, estimated at	43,000,000	
Fire-brick sent to other parts of the United Kingdom, estimated at	27,500,000	
Fire-bricks exported	9,500,000	
	80,000,000	
Fire-clay exported, estimated at	3,000 tons.	
Fire-bricks made in the year 1838, estimated at		7,000,000
Fire-bricks used in the locality in 1838, estimated at	2,500,000	
Fire-bricks sent to other parts of the United Kingdom in 1838, estimated at	3,000,000	
Fire-bricks exported in 1838, estimated at	1,500,000	
	7,000,000	

ON THE PRESENCE OF SULPHUR IN ILLUMINATING AGENTS.

M. Vohl has published the following remarks on the presence of sulphur in materials used for lighting purposes and the mode of detecting the same: Endeavors have always been made to separate from gas for lighting purposes the sulphur which it generally contains, so as to prevent in its combustion the formation of sulphurous acid. This acid not only exercises a deleterious influence upon the respiratory organs, but also destroys the vegetable colors of tapestry, paper-hangings, &c. It is generally considered that the sulphur found in coal-gas is in the state of sulphuretted hydrogen or sulphuret of carbon, and metallic oxides are used for the absorption of these impurities. M. Vohl has made experiments upon different samples of commercial benzine, and from the result he concludes that benzine often contains sulphur in combination, which is found in that portion that boils under 176° Fahr. The sulphur in combination with the carburetted hydrogen cannot be separated without destroying them. On passing gas obtained from the distillation of coal through metallic pipes, kept cool, we obtain, beside water, a mixture of naphthaline and benzine, an oil of an unpleasant odor, boiling below 176° Fahr., and containing the hydrocarbonated combination of sulphur. The apparatus employed by M. Vohl is composed of a tin worm about 11 yards long and half-an-inch internal diameter, surrounded by a mixture of ice and salt. The benzine water and naphthaline form in the interior of the worm oily concretions, whilst the sulphuretted hydrocarburet falls into a glass receiver at the bottom of the worm, also surrounded by a freezing mixture. The gas submitted to trial was free from sulphuret carbon, and the sulphuretted hydrogen removed by its having been washed in basic acetate of lead. To discover the sulphur in benzine and in the oil obtained from coal-gas, M. Vohl employs the following method: Introduce 30 to 45 grains of the oil, supposed to contain sulphur, into a dry test tube, to which add a piece of potassium, the surface being freshly cut; this mixture is then submitted for 10 to 15 minutes to the temperature of boiling oil. If the suspected oil contain sulphur, the brilliant surfaces of the potassium become covered with a red or brown pellide, composed of sulphuret of potassium. On then adding a few drops of distilled water, it becomes partly decomposed by the potassium, and dissolves the sulphur set free; one drop of alkaline nitroprussiate, if now added to this liquor, is sufficient to obtain the beautiful violet color characteristic of sulphur. The purified commercial benzine almost always contains a certain quantity of sulphur, which may be detected by the above means. Sodium may be employed as effectively as potassium. It often occurs that oils, originally exempt from sulphur, contain it after having been treated by sulphuric acid. As, for example, the oily products arising from the distillation of bituminous schists are composed of a mixture of aldehydes and acetones, which both easily combine with alkaline sulphites. When oils contain the sulphur in the state of sulphurous acid, the potassium test can also be employed; the sulphurous acid is composed, and an alkaline sulphuret is formed. The brown appearance upon the surfaces of potassium preserved in naphtha arises very often from the sulpur contained in the oil.

Virginia City, N. T.—From the San Francisco *Mining and Scientific Press*, we learn that a mammoth project for supplying Virginia City, Nevada Territory, with water has been devised. It is proposed to collect the water from several small mountain streams to the northward and westward of Washoe Lake and bring the water so collected into Virginia. To do this, it is necessary to convey the same across a valley a distance of six miles, the lowest depression of which is 1,200 feet below the required level at which the valley must be crossed to reach Virginia City. To do this, one of two methods must be adopted—either to pump this water up to an elevation of 1,200 feet by machinery, or to carry it across the depression in iron pipes. Ordinary cast-iron pipes will not stand the pressure; hence *boiler iron* must be used. The pressure at the greatest depression will be 651 lbs. to the square inch, which is equivalent to a pressure in a 42 inch boiler of 235 lbs. The pipe at this point will have to be half an inch thick. But as this pressure will only extend for a quarter of a mile, it is estimated that an average of one-quarter of an inch throughout the entire distance will be ample. This will make the amount of weight of iron to be used—32,000 feet of 15-inch pipe, half an inch thick—within a fraction of 680 tons; which at 15 cents per lb. will give $191,700 as its cost. The entire cost of the work, together with service pipe laid through the city, is estimated at $497,000. The supply furnished will be 3,000,000 gallons per each 24 hours.

Advance in the Price of Gas in Philadelphia.—The conspiracy—for it is all that—to raise the price of coal, and keep it high, will affect the public beyond cooking and supply of heat in dwelling-houses, stores and factories. The trustees of the public gas-works have been compelled to give notice that "the price of gas consumed on and after January 1, 1864, will be two dollars and fifty cents per thousand cubic feet, with a discount of five per cent. if paid within five days after presentation of the bill, subject the United States tax." The present price is $2 25 per thousand cubic feet, less one-ninth discount for prompt payment within five days. At present, with this deduction of one-ninth, the price of gas is $1 96 per thousand feet; the new scale will make it $2 35, which is a serious increase. Of course, such an advance will be felt by all consumers. At the same time, it must be allowed that it is not more than circumstances warrant, the price of coal being more than double what it was three years ago. The public must bear it, while the railways and the coal-vendors grow wealthy out of the public loss. —*Philadelphia Press, Nov.* 17.

Gas Stealing in England.—Another case of gas stealing is reported by the English papers, this time at Nottingham. A man, named James Brazier, was charged with having unlawfully caused a pipe to be laid from the mains of the Nottingham Gas-Light and Coke Company without their consent. The charge was not denied, but the counsel for the defence stated, that the offence had been committed by the defendant's wife, he not knowing anything of it. The Court fined him £2 and costs.

PATENTS.

UNITED STATES.

40,334.—C. T. Day, Newark, N. J., for a Lamp:

I claim the combination with the burner, C, and socket, A, of the tube, D, opening, g, spiral grooves, e, and pins, f, substantially in the manner herein shown and described.

40,353.—Oscar F. Morrill, Chelsea, Mass., for an Aero-vapor Burner:

I claim the improved aero-vapor burner, as not only constructed with the fluid vaporizing conduit, D, arranged so as to extend across or over the foraminous cap, A, and into the chimney, C, and from thence to pass downward, and afterward into the air and vapor-mixing chamber, B, but as having that portion of the conduit which is situated immediately over the said cap provided with the tubular arch, D' (or its equivalent), to project upward within the chimney, the same being for the purpose or purposes as hereinbefore specified.

I also claim the improvement of the extension of the conduit, D, downward through the caps, A, and within the air and vapor-mixing chamber, in manner substantially as specified.

I also claim the combination of the heater or heat-conductor, F, with the aero-vapor burner, and the conduit, D, applied thereto, substantially as described.

40,361.—Christian Reichman, Philadelphia, Pa., for a Lamp Shade Supporter:

As an improved article of manufacture I claim a lamp-shade supporter with springs, a' b', and projections, c, cut at one operation in a single piece out of sheet-metal and then bent in annular form with its ends secured by the piece, f, and slots, e e, or other fastening which will admit of the expansion and contraction of the supporter, substantially as and for the purpose herein set forth.

40,368.—W. G. Sterling, Bridgeport, Conn., for a Lamp:

I claim the combination of the skeleton bridge, H, with the tube, G, and also in combination with the disk, L, to operate substantially as described.

40,369.—Charles Süssner, a citizen of Great Britain, residing in the United States, for a Filter:

I claim the arrangement of the two filters or filtering chambers, C C', with reference to the inlet and outlet pipes extending there, from and to the chamber, B, and its outlet pipe, d, in the manner and for the purpose substantially as set forth.

I claim, also, the movable diaphragms, c c', made to slide in the filtering chamber for packing or loosening the filtering material substantially as described.

40,376.—A. H. Wood, Boston, Mass., for a Gas Blow-pipe:

I claim the employment, in a gas blow-pipe, of one or more reservoirs for containing water or other volatile substance, and provided with a means of heating the same, so as to produce vapor to commingle with the gas and flame for the purpose of intensifying the heat, substantially as described.

I also claim the cap, F, provided with holes, f, and so arranged as to control the admission of air through the holes, e, in the manner and for the purpose substantially as herein described.

40,392.—John Briggs, Louisville, Ky., for an Apparatus for Condensing Steam and Elevating Feed Water. Antedated Oct. 20, 1863:

I claim the deflected water-pipe, G', and steam-pipe, E E, when combined with the exhaust port of a steam-engine, in the manner and for the purposes herein specified.

40,401.—Minor H. Fowler, New York City, for a Lantern:

I claim, first, The spring catches, I, constructed in the manner herein shown and described by slitting a strip of metal longitudinally, employing one side as the spring attachment, turning the other side up into form for the thumb-piece and bending the connecting end into form for the catch or latch, so that the said latch, thumb-piece and spring attachment may all be formed of a single piece of metal as specified.

Second, The combination of the springs, I I, cylinder, e, and rock-shaft, G, with the band, D, and slot or opening, g, all in the manner herein shown and described.

40,439.—C. C. Warwick, Philadelphia, Pa., for a Lamp Burner:

I claim having the perforated ring, D, which incloses the wick tube, made separate and independent of the burner, and arranged to operate as herein shown and described, so that said ring can be lowered at pleasure, and the wick tube thus exposed on all its sides, all as set forth.

40,447.—J. W. Hopkins (assignor to himself and James Clayton, Brooklyn, N. Y.,) for a Pump Valve:

I claim the arrangement of the independent oscillating valves, B B', constructed as set forth, with the partition, b, case, A, and the several water-ways, all in the manner herein shown and described.

40,458.—John Clark, Canandaigua, N. Y., for Cars for Petroleum:

I claim the application of a tank, D, under the platform, A, of a railroad car, substantially as and for the purpose specified.

40,485.—F. G. Johnson, Brooklon, N. Y., for Water Meter:

I claim the peculiar arrangement and combination of the crooked pipe, F, with the meter, C I, substantially in the manner and for the purposes set forth.

40,494.—George Mullikin, Littleton, N. H., for Water Wheel:

I claim the combination of the horizontal plates, e, with the backs of the buckets, B, substantially in the manner herein shown and described, whereby the water is made to act with its full force upon the faces of the buckets, and is prevented from re-acting against the backs of the buckets, all as set forth.

I also claim the arrangement of the segment plate, J, with the pivoted gate, H, and shaft, I, in the manner herein shown and described.

40,504.—John Sheffield, Williamson, N. Y., for Fluid Meters:

I claim, first, The weight, K, and tilting guide, L, in combination with the diaphragm, F, valves H H', rock shaft, I, and registering apparatus, M, constructed and operating in the manner and for the purpose substantially as shown and described.

Second, The tappet, p, hinged to the side of the tilting guide, L, and operating in combination with the weight, K, double-hooked catch, p^1, and dogs p^2, p^3, substantially as and for the purpose set forth.

40,566.—George A. Jones, N. Y. City, for a Lamp:

I claim constructing lamps, which use an impelled current of air to promote combustion, with an outer or enclosing case or shell surrounding the oil chamber, but at a little distance from it, so that the impelled current of air may pass up around the oil chamber, and in the space between it and the enclosing shell, to the wick, for the purposes set forth.

40,569.—Jonathan Lilly, of Castle Creek, N. Y., for a Water Elevator:

I claim the combination and arrangement of the lever, L, spring, S, brace, b, pawl, P, ratchet wheel, R, and windlass, W, as and for the purposes set forth.

40,591.—S. Lloyd Wiegand (assignor to Abraham Hart), of Philadelphia, Pa., for a Gas-Heating Apparatus. Ante-dated Nov. 2, 1863:

I claim, first, The combination of the burner, H, and adjustable cap, J, with the funnel, X, when used in the manner and for the purpose set forth.

Second, Combining the external fender or chimney, C, with the burner, H, adjustable cap, J, and a funnel, X, for the uses hereinbefore specified.

Third, The manner of attaching the boiler and fender to the base ring, E, by means of the lugs, T T T, and projections, Z Z, ring, G, and bolts, D D D, when in combination with the adjustable screw funnel, constructed and used in the manner set forth.

RE-ISSUE.

1,553.—Abel Brear, Saugatuck, Conn., for a Device for Raising and Forcing Water by Steam.—Patented April 1, 1862:

I claim the combination of the steam or air pipe, A, terminating in a nozzle of cylindrical or nearly cylindrical form, the open socket, C, and delivery-pipe, D, substantially as and for the purpose herein specified.

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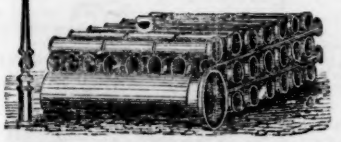

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PATENT

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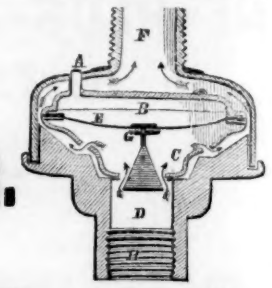

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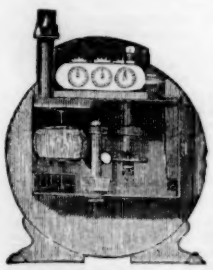

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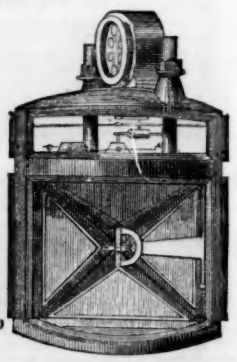

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EXPERIMENTAL METERS, PRESSURE REGISTERS, PRESSURE GAUGES, &c., &c.

The firm of HARRIS & Co., which comprises the senior partner and only practical Meter maker of the late firm of HARRIS & BRO., will continue the manufacture of Meters, &c., of every description, and will guarantee to furnish an article of Meters equal to the best in the country, at the lowest rates, and combining the latest improvements with great durability and accuracy. The reputation of the Meters of the late firm of HARRIS & BRO. is confidently appealed to. All our Meters are tested by a sworn Inspector. TERMS EASY.

NE-PLUS-ULTRA WATER, GAS, AND STEAM JOINT,

R. C. ROBBINS, Inventor and Patentee

THE PROPRIETORS of this unrivalled joint are now prepared to introduce it to general use, and to guarantee that, in all respects, it will fulfil perfectly all the requirements of either water, gas, or steam. It is a joint which remains in all situations absolutely tight.

The following illustrations, with the appended explanations, will give a good idea of the improvement:

Fig. 3.

Fig. 1.

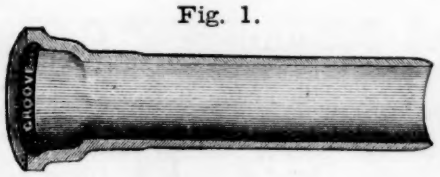

Fig. 2.

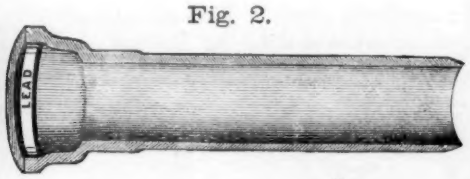

Fig. 4.

FIG. 1. Is a sectional view of a pipe showing a groove to receive a lead ring.

FIG. 2. Is a sectional view of a pipe showing a lead ring in the groove.

FIG. 3. Represents a former, which is used in the bell end of the pipe while casting the lead ring. Before using the former, however, a strip or belt of India rubber is first inserted in the socket, against which the former rests to prevent the lead escaping from the groove while being cast. Upon the cooling of the lead, the former and rubber ring are withdrawn from the socket, and the lead ring is left projecting inwards from the groove all around, forming an indestructible packing to receive the spigot-end of the pipe.

FIG. 4. Shows two pieces of pipe in connection with an hydraulic jack, by which the spigot-end of the pipe (which is cast tapering and may be cast in a chill), is forced into the lead ring in the groove which perfects the joint. A, represents the jack; B, B, the chains by which the pipes are drawn together; and C, C, pieces of pipe.

This ring joint packing may be cast at the foundry or any convenient place, and when delivered at the ditch, may be laid, and perfect joints formed, by any laborer, above or below the surface, or in ditches filled with water, there being *no joint ditching required*, and it can be laid with very great rapidity.

Among the economies realized by this joint may be enumerated, the saving in the weight of the pipe, in the amount of lead required to be used in forming the packing, in the labor of ditching, and in laying the pipe.

The bell or socket may be cast one-half the usual length, as the width of the groove requires, but from a half to one and a half inches, according to the size of the pipe, thus saving in the total weight about two hundred pounds per ton.

The weight of lead required to form this joint, as compared with the amount of lead used in forming a joint according to the old method, is fully seventy-five per cent. less, only so much being required as to maintain the compensating principle, or enough to allow (upon the raising or depressing of the line of pipe out of a direct line) what is lost upon one side of the ring packing, to take its place upon the other; thus securing flexibility of the joint without affecting its reliability. The use of yarn or hemp packing is dispensed with, the cost of which is an entire saving as compared with the old method of making joints.

The saving of labor in ditching is the total amount usually expended in digging joint-holes, there being *no joints to be caulked.*

The saving in labor in laying pipe furnished with this joint is a sum equal to the whole cost of carrying lead, fuel, ladles to the ditches, casting the lead, bailing out water, and the entire labor of caulking, less only the sum charged for casting the lead ring packing at the foundry, which is comparatively trifling. This last-mentioned economy has been estimated by the best engineers at seventy-five per cent., or the same as the saving in the quantity of lead used.

The cost of pipe cast from our patterns is the same per ton as pipe cast for the old form of joint. The principal iron-founders propose to charge the same price.

We have submitted these joints in water-pipes to a pressure of two hundred and fifty pounds to the square inch, and they have remained perfectly tight. It has also been submitted for months in gas-pipes to the ordinary pressure of our city gas-mains, without any leakage whatever. We are aware that these statements may be deemed by many extravagant, but the merits of the improvement warrant them all, and the most skeptical may be fully convinced by an investigation of its value, and by witnessing the tests to which we submit it, or by its use under any conceivable circumstances.

For further information, or for prices and terms, which will be very reasonable, apply to

R. C. ROBBINS & CO.,

No. 197 GREENWICH STREET, NEW YORK.

TESTIMONIALS.

OFFICE OF THE WATER COMMISSIONERS,
CITY HALL, JERSEY CITY, October 14th, 1863.

Dear Sir,—On the 26th of May last, about two hundred and sixty feet of cast-iron water-pipes, six inches in diameter, with joints constructed according to your invention, were laid for the Jersey City Water-Works, in Prospect street.

The operation of uniting the joints of the pipes, was performed with remarkable facility, and with an important saving in time, materials, and labor. The joints proved perfectly water-tight, after turning the full head of water on the pipes.

In my opinion, your invention has proved entirely successful, and will be found highly beneficial to water companies.

Yours, respectfully,
ROBT. C. BACOT,
Superintendent and Engineer, Jersey City Water-Works.

MR. R. C. ROBBINS.

ENGINEER'S OFFICE, CROTON AQUEDUCT DEPARTMENT.

Dear Sir,—I have examined your plan for making joints in cast-iron water pipes, and have a report from one of my assistants, of certain experiments made by you, to prove the certainty and economy with which the joints can be made, and their stability when finished.

I think the experiments showed that the joints could be made quite as rapidly, if not more rapidly, than those made in the ordinary method now in use; the quantity of lead used was less than that required in the common joint, and no yarn packing was required. In these respects, your joint seems superior.

After the joints were made, a pressure of three hundred pounds to the square inch, was put upon the pipe in such a manner as to test the efficiency of the joint to prevent both leakage of water, and separation of the pipes from each other longitudinally. This pressure failed to produce either leakage at the joint, or separation, so long as the pipes lay in a direct line; but on deflecting them six and a half inches, in a length of twelve feet, the joint commenced leaking. It is fair to add, that this is a greater deflection than would often be found necessary in laying pipe.

I think the efficiency of the joint in both the points tested in this last experiment, might be increased by increasing the quantity of lead, both in thickness and width.

Altogether, the result of the experiments was such that I have determined to make a more thorough test of your invention by putting down about one thousand feet of pipe, when we commence our operations for the coming season.

The diameter of the pipe subjected to experiment, was six inches, and is the same size that I propose to put down next year.

I am, very respectfully, your obedient servant,
A. W. CRAVEN, Chief Engineer, &c.

To R. C. ROBBINS, Esq., Jersey City.

METROPOLITAN GAS-WORKS,
ENGINEER'S OFFICE, NEW YORK, October 9th, 1863.

Dear Sir,—The undersigned had the pleasure of being present at an experimental test of your patent joint for gas and water pipe, made at the yard of the Croton Aqueduct Department, and cheerfully testify to the results obtained, namely:

First experiment was made with two lengths of eight-inch pipe, jointed together, when a pressure of three hundred pounds to the square inch was applied. This pressure did not force the pipe apart, nor start the joints, but they remained, during this experiment, perfectly tight.

Second experiment was made by deflecting the pipe five inches, which is about equal to eighteen inches in one hundred feet, and the same pressure applied, which caused a small leak at the joints.

Third experiment was made by taking the pipes apart and rejointing them, when the same pressure was applied when lying straight and when deflected; at this experiment there was no leakage.

From these severe tests it is my impression that the superiority of your patent joint has been made manifest, and that it must eventually supersede the old way of jointing pipes together, saving both time and material.

Wishing you success in your enterprise,

I am, very respectfully, yours, &c.,
AMBROSE J. WHITE, Engineer.

To R. C. ROBBINS, Esq.

OFFICE OF THE METROPOLITAN GAS-LIGHT COMPANY,
NEW YORK, October 9th, 1863.

Dear Sir,—Having been present at the testing of your patent joint for gas and water pipe, at the yard of the Croton Aqueduct Department, I can testify to the results as stated by Col. A. J. White, and fully concur with him in the opinion expressed in his letter to you of this date.

Very respectfully, yours,
W. TITUS, Secretary.

R. C. ROBBINS, Esq.

NEW YORK, October 23d, 1863.

Gentlemen,—I am pleased to be able to inform you, that we are fully satisfied that we have done well in adopting your "Improved Joint," in the construction of an aqueduct which we are now building on Oil Creek, Northwestern Pennsylvania.

We have ten miles of three and four inch pipe to lay this season, and, in our estimation, the perfection of the joint, economy in lead, and rapidity with which the pipe can be laid, render it entirely preferable to any other method of laying pipe.

Our Mr. Hutchings advises us that he is putting down the three and four inch pipe at the rate of twenty-five to thirty lengths per hour, with two men in the trench. We are much pleased with this result.

Respectfully yours,
HUTCHINGS & FOSTER.

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PRINCE'S METALLIC PAINT,

AN INDESTRUCTIBLE COATING FOR

IRON, TIN, and WOOD.

It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Four Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

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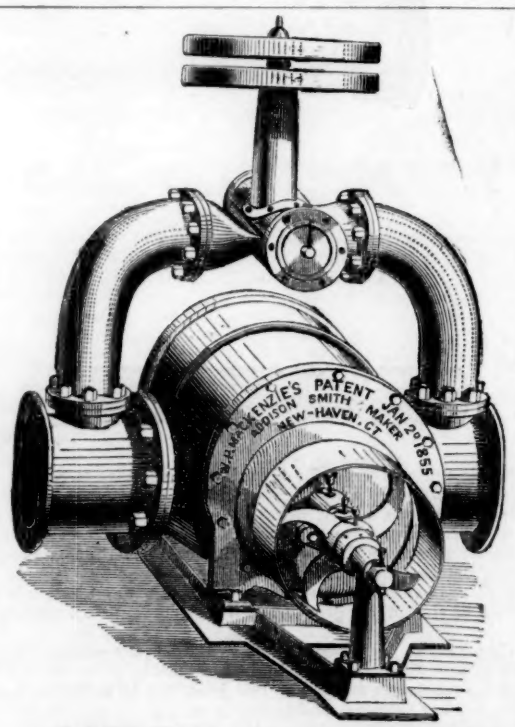

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The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. fuel. Address SMITH & SAYRE, 458 Broadway, New York.

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